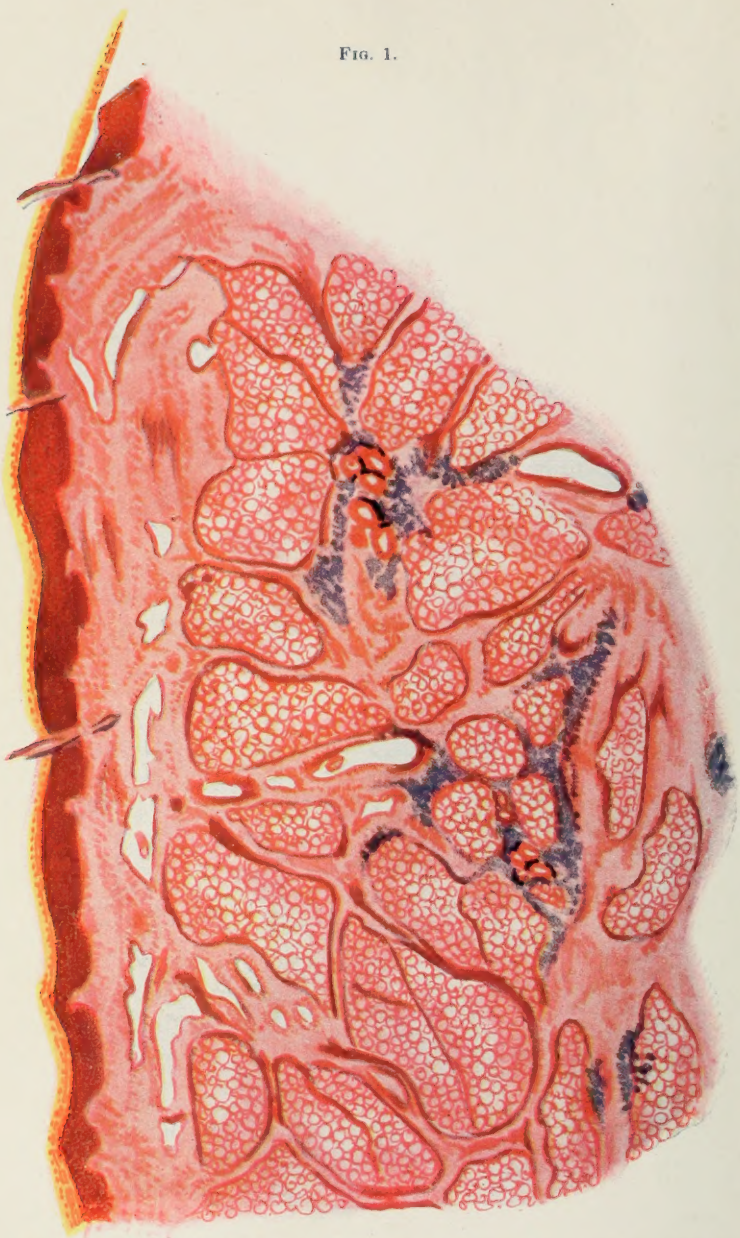
FIG. 1.



Section of the skin and subcutaneous connective tissue, showing clusters of bacteria stained blue.

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INTERNATIONAL CLINICS

A QUARTERLY

OF

ILLUSTRATED CLINICAL LECTURES AND
ESPECIALLY PREPARED ORIGINAL ARTICLES

ON

TREATMENT, MEDICINE, SURGERY, NEUROLOGY, PÆDIATRICS, OBSTETRICS, GYNÆCOLOGY, ORTHOPÆDICS, PATHOLOGY, DERMATOLOGY, OPHTHALMOLOGY, OTOLOGY, RHINOLOGY, LARYNGOLOGY, HYGIENE, AND OTHER TOPICS OF INTEREST TO STUDENTS AND PRACTITIONERS

BY LEADING MEMBERS OF THE MEDICAL PROFESSION THROUGHOUT THE WORLD

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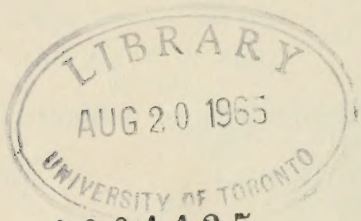

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Clinics

DANGER SIGNALS DURING PREGNANCY

A LECTURE DELIVERED AT NOTTINGHAM IN SEPTEMBER, 1920, UNDER THE NATIONAL ASSOCIATION FOR THE PREVENTION OF INFANTILE MORTALITY

By J. W. BALLANTYNE, M.D., F.R.C.P., EDIN.

Physician in Charge of the Antenatal Department of the Edinburgh Royal Maternity Hospital

THE title of this address has an ominous if not actually an alarming sound. No one likes to hear or to speak of danger signals. It is, therefore, well at the very outset to take notice of the exact words of the title, namely, "Danger Signals During Pregnancy," not "of pregnancy." Pregnancy as such is not a danger and has no danger signals. A healthy mother carrying a healthy unborn child is not an instance of disease, far less of death, but contrariwise of health and of abundant life, or life so abundant that one is justified in putting it in the plural and saying "lives." The expectant mother has not only her own life richly to enjoy, but she also carries another life, compounded, so to say, of her own and of that of the person dearest to her in the world; and in that life, too, she may reasonably look for and find felicity.

PREGNANCY A STRESS PERIOD

It is admitted at once that pregnancy is a time of stress. To use a quaint old English phrase, one does not carry a child standing on one leg. All a woman's powers are needed for this adventure, which is justly called nature's greatest achievement. There is stress, there is strong effort, but there is not strain, if the stress is met by sufficient reserve power. Stress sufficiently provided for is an indication of health so fully and so firmly established that it has, so to say, a surplus for adventure. When a manufacturer adds a new department to his business there follows immediately a period of stress, naturally so; but it was the satisfactory state of the business which led to the extension, which made it possible, and which in many instances

carries it triumphantly on to what is no less than an added life to the whole concern. Stress, therefore, is not to be feared unless it results in strain. Pregnancy, then, is naturally a time of stress, but the stress is without symptoms, at any rate without danger signals. These come with the development of strain, and they are the indications of it. They are the things one must be on the lookout for; they are the things to cure; they are the things which it is better to prevent than to cure. To cure them, or, better still, to prevent them, one has to cure, or, better, to prevent stress becoming strain.

CAUSES OF STRAIN

There are two main causes which convert the stimulating stress of pregnancy into the miserable strained state when the joy of life goes and gloomy forebodings arrive in troops.

The first of these is physical weakness on the part of the expectant mother. This may show itself only during the pregnancy; in other words, she may have sufficient strength for ordinary living but not quite enough for the stress period of pregnancy. This is one of the explanations of the apparent anomaly of a woman who has never been ill in her life, as the phrase goes, breaking down in her expectant time. She has never been ill before because she has never before been so tested. Or, again, she may even in the non-pregnant state have been subject to illness, it may have been connected with the heart or the lungs or the kidneys or the nervous system, it matters not; with the additional stress of carrying a child laid upon her she becomes seriously ill. It is possible, however, that this worsening of her condition may be to some extent concealed by the flood of new life sweeping through her in and because of the pregnancy; but this is a temporary amelioration and is almost invariably lost immediately after her child is born. As a general rule the existence of physical weakness before a pregnancy will reveal itself during the pregnancy by recognizable danger signals.

The second of the chief causes of stress becoming strain in the expectant state is more easily overlooked. It is due to some fault in the unborn infant himself or in the special tissues and organs which are developed in connection with his coming, such as the afterbirth or the waters. The child may be diseased and his morbid condition may react upon his mother, or he may be malformed and put a heavier

strain upon her by reason thereof; or, again, he may simply be too large and require so much nourishment from her as to interfere with her own welfare. The waters which surround him in the womb may be excessive in amount and so lead to pressure symptoms. Finally, he may be quite normal, but be accompanied by a second life equally normal, and the two children make so great a demand upon the mother as to constitute an overdemand. Even the strongest of women totters under twins. Do not let this be forgotten, that the overstrain from twins may be due not only to two unborn infants in the womb, but also to one in the womb and the other at the breast. Some of the danger signals of pregnancy are undoubtedly due to the double demand on the expectant mother, which is made when she is suckling one infant at her breast and carrying another infant in the uterus. So far as the production of strain is concerned, these two infants, though of different ages, are really twins.

The causes, therefore, of danger signals during pregnancy are divisible into, first, physical inability on the part of the mother and by reason of faults in her tissues and organs, and, second, into morbid states of the, as yet, unborn infant and his baggage (so to say) which so overburden even a physically fit woman as to cause a threatened breakdown. It remains to be added that when these two groups of causes are combined the most serious danger signals are hung out, and the most precarious maladies arise. When, in other words, a woman physically unfit is also the prospective mother of a diseased or abnormal child, then the pregnancy is so near to disaster for both mother and child as to require the most drastic and prompt means for its salvation.

MOST PREGNANCIES ARE HEALTHY

On the other hand, it should be added at once that most pregnancies do not fall under either one or other of these two groups and that extraordinarily few can be regarded as belonging to both. In dealing with expectant mothers the doctor, so to say, is always preparing for the exceptions and is legislating for the unusual. In a fleet of ships it is only one now and again that signals S.O.S., so in a group of expectant mothers it is only one now and again who is in real danger. Nevertheless, there is a necessity to test every one, for some of the danger signals can only be detected by the trained eye,

and, further, some of the expectant mothers are not aware that they are signalling at all. There is also the class of mothers who, through lack of forethought or disregard of consequences, pay no attention to any indications of danger; they have to be helped almost as if it were against their will. There is no more blameworthy act on the part of neighbor, nurse, or doctor than to say to a suffering expectant mother, "All your troubles are due to your condition, your condition is a natural one, and therefore there is no need or necessity for you to think anything at all about it; you will be worse before you are better." It would be a ludicrous travesty of the facts if it were not so heinous an offense against the canons of healthful reproduction. The authoress of "Laddie" and other attractive works of fiction weaves such a case as the above into the texture of a recent novel, "A Daughter of the Land," and does not hesitate to point the moral; she deserves the thanks of all child welfare workers for her courage and common sense.

DANGER SIGNALS IN FIVE HUNDRED CONSECUTIVE PREGNANCIES AT THE ANTENATAL CLINIC

In order to bring out the relative frequency of danger signals in pregnancy I have arranged in tabular form some details of the last five hundred cases which have passed through the Antenatal Clinic at the Edinburgh Royal Maternity Hospital under my care during the past few months in 1920. It will be borne in mind that this clinic is a sort of clearing house for the other antenatal clinics in Edinburgh, besides receiving many cases sent to it by practitioners with a view to their admittance to the prematernity wards in the hospital; the proportion of dangerous cases dealt with in it must necessarily be high. It will be seen that there were 32 cases (or 6 per cent.) with marked danger signals, the nature of which is described; there were 258 cases (or 51 per cent.) with slight, often very slight, danger signals, which are also stated in detail; and there were 210 cases (or 42 per cent.) with absolutely no danger signals at all. The high proportion of cases with signals indicating venereal disease (51, or about 10 per cent.) was probably due to the fact that all pregnant women suffering from venereal trouble are sent to this clinic from Edinburgh and from some surrounding districts. Three deaths occurred among the five hundred patients referred to. In every instance the

death took place after delivery. In one instance, a Cæsarean section, the fatal issue was due to nothing which had occurred in the pregnancy and could not conceivably have been averted by anything done at the antenatal clinic. In the second case the woman had been attending at the clinic and had been treated in the antenatal ward for toxæmic vomiting; she had improved very markedly and had then ceased to attend; some weeks later she returned to the hospital with severe accidental hemorrhage in labor and died as a result of this bleeding, accompanied as it was by post-partum hemorrhage. The third case was one of grave toxæmia, followed by eclampsia in labor in a woman whose blood gave a positive Wassermann reaction. I admit that in this instance our best efforts were ineffectual and that even the careful watching the woman received was not rewarded by success. The presence of syphilis, however, was only discovered shortly before death. These, then, are the risks which were run by a series of 500 women who may justly be regarded as exhibiting the dangers of pregnancy in a much more than usual way; for they were to some extent cases segregated and picked out because of their abnormal character. I believe the second death might have been prevented by a continued attendance at the clinic; the death following the Cæsarean section was outside antenatal control; so that only the eclampsia death could be called a failure on the part of antenatal supervision and care.

The details were as follows:

FIVE HUNDRED CONSECUTIVE PREGNANCIES SEEN AT THE EDINBURGH ROYAL MATERNITY HOSPITAL (ANTENATAL CLINIC).

Cases with marked danger signals.....	32
Cases with slight danger signals.....	258
Cases with no danger signals at all	210
	500

The cases with marked danger signals.....	32	or 6 per cent.
Grave albuminuria as leading danger.	9	
Toxæmic vomiting	2	
Pyelitis (*Bacillus coli* infection)...	2	
Appendicitis	1	
Phthisis	1	
Contracted pelvis (marked) 17		
Required Cæsarean section...10		
Required induction of labor... 5		
Not yet delivered 2		

The cases with slight danger signals.....	258	or 51 per cent.
Constipation	40	
Albuminuria	37	
Gonorrhœa	31	
Contracted pelvis (slight)	25	
Malpresentations and malpositions of child	22	
Dyspepsia	20	
Syphilis	20	
General weakness requiring tonics.....	11	
Heart symptoms	10	
Slight hemorrhages	9	
Lung symptoms	7	
Vomiting (not serious).....	6	
Varicose veins	6	
Rheumatism	6	
Threatened miscarriage	3	
Prolapse of uterus	3	
Cystitis	2	
	258	

DANGERS MAY BE IMMEDIATE OR DEFERRED

Danger signals during pregnancy may warn of immediate or of distant risks; in other words, they may indicate approaching disaster in the pregnancy itself or at the time of confinement. Further, some of them may be recognized by the expectant mother herself with very little difficulty, whilst others require a skilled medical attendant for their detection. Even with regard to the obvious danger signals professional knowledge is needed for the estimation of the amount of risk, for the determination of the kind of impending mischief, and, of course, for the application of the appropriate remedies to prevent or to cure the threatening disease. A woman who has already carried a healthy child normally through the nine months of pregnancy and has had a straightforward delivery has a standard wherewith to compare all future times of expectancy and is in this respect so much better off than a young mother approaching her first confinement; but there are many matters in which a doctor alone can be a safe guide, and the midwife and even the health visitor possess information which will be of service to all expectant mothers. No one, not even a doctor, can wisely doctor himself or herself, and the woman passing through the time of gestation is no exception to this rule. Most of us like to camouflage our ailments and we cannot be safely left to work our own cure.

In connection with the danger signals of pregnancy expert knowledge and its application are essential. The antenatal clinic and medical supervision of pregnancy are as necessary to a civilized community as a good water supply. The pregnant woman has no prerogative to suffering in the time of her expectancy any more than a man has the right to drink fouled water and take typhoid fever; in both cases, for the sake of public health and national well-being, the State is pledged to provide safety to the citizen and citizeness. Obligations, however, are but slowly accepted, and the wheels of the chariot of hygiene have driven heavily in the past. I can remember when the physician stood far away from the medical officer of health; and the recognition of the near relationship existing between midwifery and public health is hardly yet completely made.

DANGER SIGNALS

It will not be possible within the time at my disposal to refer even briefly to all the danger signals which may appear in pregnancy; but I shall try to take some notice of those which have the largest content of risk or which are most likely to pass unrecognized. Let it be borne in mind throughout that what is here stated is not a full consideration of the matter and in no way is to be regarded as a substitute for the living voice and the expert hand of the physician experienced in the pathology of pregnancy and the hygiene of childbearing.

BLEEDING

From the very first days of pregnancy right up to the birth of the infant bleeding is always a grave warning. In travelling by land or by sea the red light always betokens danger and so it is in a pregnancy with a red discharge. *Blood before the birth of the baby is bad* ought to be a proverb in midwifery. In the early months of pregnancy it commonly means an impending miscarriage. If one remembers what a pregnancy really is, namely, the first nine months of the life of a child, and if one further grasps what a miscarriage really is, namely, the premature ending of that life, there is no need to add that a miscarriage is, therefore, the very worst thing that can happen to a pregnancy. Within the past few years a sort of general assent has been given to this very obvious conclusion; but a great deal of shouting from the housetops on this subject is still needed. There is even now

an immense amount of foolish talking and of wild thinking on miscarriages. The phrase "only a miscarriage" is still permitted, whereas it ought to be criminal to employ it; it is *lèse majesty* against the public health, it is an offense against Queen Hygiene. Further, self-deception, conscious or unconscious (it matters little), is still widely practiced regarding early miscarriages. A young healthy woman whose periods have always been regular, marries; her second or third menstruation thereafter is "delayed" for a week or ten days. That is what she says and possibly also thinks; but what has really occurred has been an abortion, an early one it is true, but one which ought, according to the laws of health, to send her to a doctor for advice as quickly and as inevitably as one at the third or fourth month.

Bleeding then in the early months is a danger signal; it commonly points to an impending miscarriage; but let it never be forgotten that prompt and proper treatment which is the precise and particular reply to this red flag of danger may prevent its becoming more than a threat. Hundreds and thousands of threatened miscarriages which at the present time run on into complete or, worse still, into incomplete abortions are capable of being prevented and yet are not so prevented; hundreds and thousands of antenatal lives are thus lost and hundreds and thousands of mothers have their health weakened—and may count themselves lucky if they be not made invalids for the rest of their lives. There is probably no dangerous condition for which there is less provision made in our civilized economy than the miscarriage. Strong words are needed in this connection, for the full danger has not been disclosed. Just as bleeding is the danger signal pointing to a miscarriage, so a miscarriage is in its turn the danger signal pointing to a whole group of other wrong things. It may point to a displacement of the womb, to inflammation of that organ or of the parts around it, to heart disease or kidney disease, to influenza complicating the pregnancy, and to many more such anomalies and maladies; but it may also indicate worse things, such as syphilis or chronic alcoholism, with all the weakening of the moral fibre of the nation which they signify, or the practice of criminal induction of abortion, with all the suggestion of misery and wickedness that underlies that sin against reproduction. Surely a red discharge in the early months of pregnancy is a most urgent signal of real danger both immediate and remote to both infant and mother, and it calls for a

quick answer. When a man or a child is run over on the streets of our great cities only a minute or two elapses before an ambulance, that most beneficent of modern inventions, is on the spot and the injured person is on the way to a place where the best means of treatment in the hands of the most skilled of doctors, surgeons, and nurses are ready for the saving of life and the prevention of disablement. No less immediate and effective help ought to be available for every woman who is threatened by the loss of a young life. I do not mean that she shall be whisked away in an ambulance; *mutatis mutandis* is a maxim which must be applied here; under the circumstances it will generally be enough if she be put to bed and kept at complete rest; but I do mean that the proper treatment for her and her unborn infant should be forthcoming as quickly and with as great certainty as for the street accident.

Bleeding in the later months of pregnancy indicates dangers not indeed of exactly the same sort as those already referred, but of no less gravity to the mother and of hardly less seriousness to the child. The proper answer to this signal is immediate obstetrical attention and treatment, and where these are not to be easily obtained in the patient's own home the practice of removal to Nursing Home or Maternity Hospital is coming more and more to be recognized as the best procedure. Speaking as a maternity hospital physician, I would infinitely prefer to deal with a case on the first appearance of hemorrhage than after a number of bleedings which have so weakened the woman as to handicap adversely all my best endeavors; yet at the present time it is the exception rather than the rule to have such patients sent into hospital promptly.

PAIN

Pain is a familiar danger signal under all circumstances, and it is not less so in pregnancy than at other times. The normal pregnancy is painless. The degree of danger which it indicates differs very much, being inconsiderable in many cases, and of course the kind of risk varies within wide limits; but the general statement that pain during pregnancy is a danger signal holds good, and consequently it is never safe to disregard it. In the early months it is generally of more significance than in the later, but there are exceptions to this rule. When it is accompanied by bleeding and is situated in the small of

the back or low down in front it commonly constitutes the second danger signal of an approaching miscarriage and calls for immediate attention; but it is worth while remembering that colicky pains in these regions associated with irregular bleedings may give warning of a yet more dangerous condition, the pregnancy outside the womb. An ordinary miscarriage, whilst it is, of course, absolutely fatal to the infant, is not usually a danger to the mother's life; a pregnancy outside the uterus, on the other hand, may easily be fatal to mother as well as child if not dealt with surgically. Pain in the womb accompanied by too great size of that organ for the supposed date of pregnancy should always excite suspicion; it very often points to a diseased or at any rate to an abnormal form of pregnancy. Another cause of pain in the early months is displacement of the womb and another, when accompanied by rigors or shiverings, is infection of the kidney (pyelitis); and, of course, any disease which causes suffering apart from pregnancy may be associated with it. The general rule holds good; pain calls for investigation by a doctor; it may mean little, but again it may mean so much; it is a danger signal.

In the later months other explanations of pain are more common. When it is situated at the sides of the abdomen over the course of the large bowel it is very often the result of constipation and disappears when that very frequent fault has been corrected. It may, however, be due to more serious things, such as appendicitis, a complication of pregnancy which every obstetrician has now learned to dread and which may call for surgical help at any time. It may be simply the pain of tired muscles and be curable by rest once a day (preferably in the early afternoon) or by the wearing of a supporting belt, or by both; the backache of the expectant condition is often of this nature. It may occur over the kidneys and be due to defect in these organs. A pain which always calls for immediate attention is that situated in the pit of the stomach; this may be the precursor of one of the most alarming and most dangerous complications of pregnancy, namely convulsions. All these pains are more or less persistent in their nature; pains which come and go are most commonly to be attributed to the commencement of labor. When labor is due, these intermittent pains are to be welcomed; but when they occur a month or two months before the full term they are by no means of such happy omen, for premature confinements are never free from risks to mother and to

child and they usually point to something wrong else they would not have taken place. It is exceptional for the movements of the unborn infant to cause actual suffering, although often enough they are an annoyance to which mothers refer with rather a wry smile; when they are really painful, an explanation may be found in a defect in the amount of water provided by nature for the child to move easily in.

The general rule, therefore, holds good that any pain, but especially the persistent pain, in pregnancy calls for attention and should be a matter upon which medical advice is sought. It may be the simplest thing in the world to cure it—very often a soap and water enema will do it—but on the other hand its significance may only be capable of recognition by a doctor and amenable to treatment which he or she can give.

EXAGGERATIONS OF NORMAL SIGNS AND SYMPTOMS

Another group of danger signals in pregnancy are exaggerations of what are usually described as the normal symptoms and signs of the expectant state. It is more than likely that some of these so-called normal signs and symptoms are capable of marked reduction if indeed they may not be prevented altogether. For instance, I have been much impressed at the antenatal clinic by the number of women who escape altogether from the discomfort of what is usually regarded as the inevitable morning sickness of the early months. Possibly if its causation were better understood we should be able to prevent it entirely. However this may be, excessive vomiting in pregnancy, and more particularly persistent excessive sickness, is a signal of danger which no woman can dare to neglect and no doctor afford to overlook. It calls for immediate and thorough investigation. It may be due to a cause which is easily removable by the expert, such as displacement of the womb or marked constipation; but, on the other hand, it is sometimes unhappily the result of a form of blood poisoning or toxæmia, both dangerous in the extreme and most difficult to check. Vomiting in the early morning and in the early months is so common and so comparatively harmless that a woman is strongly tempted to regard it as inevitable and to be suffered in silence; consequently, when it begins to pass beyond the ordinary bounds she will be very likely to postpone applying for advice till it has begun to affect her general health and reduce her body weight. It may be then too late. After the fourth

month there should be no sickness at all. In the later months it is always an indication of something being wrong; it may be a trifling wrongness, such as acidity or the ever-acting constipation, or it may be one of the signs of approaching convulsions; but in no case should it be allowed to go on. Baking soda will stop it in one group of cases whilst all the resources of obstetric science may fail to do so in another; but the essential fact to bear in mind is that it must be reported to the doctor and he or she must attend to it.

DANGER SIGNALS OF A NERVOUS KIND

There is a rare danger signal which must not be forgotten, for its occurrence may point to grave risk both for mother and unborn baby. This is the appearance of twitching or jerky movements of the hands, feet, limbs, and face. Such a condition of things is known as chorea or St. Vitus' dance. Notice ought to be taken of it at once and expert advice sought for. It is apt to occur early in pregnancy and to bring that state to a premature ending in abortion; in a neglected case the mother may die from exhaustion. Serious cases are very pitiable. This is a danger signal pointing to disease of the nervous system (although it may be really a form of toxæmia or blood-poisoning); and it may be well here to name a group of symptoms which point to that sad complication of the expectant state, insanity. The stress of pregnancy, in these instances, falls upon mental powers which are weakened by a hereditary tendency or by emotional happenings, and as a result strain is developed and disease set up. Anything showing a deviation from the natural buoyant cheerfulness or quiet steady assurance of the patient (according to her temperament) should be at once looked at with suspicion. A fixed belief accompanied by a reiterated expression of that belief to the effect that the patient will not get safely through her childbed should never be disregarded, far less laughed at. If treated exactly as one would treat similar early signs of impending mental trouble in the non-pregnant an equally good result may be anticipated. It is not a disease of pregnancy as pregnancy, but it is brought from a potential into an actual form by the stress of childbearing; another state of stress of a different kind might be productive of the same result. Mental hygiene during the expectant condition is a too little considered part of the prevention of disease; it is to be carried out by imparting knowledge wisely and not by a

policy of concealment of all risks. Even the so-called longings or fancies of pregnancy have a real meaning if one could only discover it. They are too often labelled as "hysterical," which is perhaps of little moment, and are consequently neglected, which is certainly of serious import. Sometimes they have a discoverable physiological explanation, being outcries of the tissues of the mother or the child for certain chemical constituents (iron, lime, acid, alkali) which are being supplied in too small amount or not at all; they are then remediable and ought to be remedied.

ROWS OF DANGER SIGNALS

So far single danger signals have been looked at; but occasionally groups of them, rows of them so to say, are exhibited, and call for attention and recognition. The most important of these associations is that which indicates failure of the kidneys or liver or both completely to do their full share of the work of the body life. It is now very well known that the underlying cause of this failure is deeper than these organs themselves and is of the nature of a toxæmia or blood poisoning; it has also to be admitted that the precise cause of the toxæmia is undetermined; but on the other hand there is the cheering fact that timely treatment will check or prevent most of the accompanying danger to mother and unborn child. It is an evil that does most harm when its presence is unsuspected. Yet, as a matter of fact, its signals are flown in full view of the eyes which are ready to recognize them. When in the second half of pregnancy an expectant mother, most often a woman passing through her first term of expectancy, begins to suffer from persistent headaches accompanied by diminution in the amount of water passed and the presence of albumen in it; when her face and hands become puffy; when her morning sickness returns, a dangerous way of describing what is really a new development, not the reappearance of an old one; when her sight begins suddenly to fail; when the pulse becomes slow and strong; when the ordinary constipation of pregnancy becomes extreme; when she tends to be drowsy and to suffer from slight mental disturbances; and when she complains of severe pain in the pit of the stomach; when these things, but not necessarily all of them, can be recognized the state of the expectant mother is perilous; and when to them such further danger signals as complete suppression of water and jaundice

are superadded the woman's system is sending out the S.O.S. and immediate help is urgently called for; she is on the very brink of convulsions, and even the man in the street knows that convulsions in connection with childbirth are grave in the highest degree and often mean two deaths, both expectant mother and expected child perishing in the disaster. Such an ending to nine months spent in healthful preparation for the dawning of a new life is tragic; and it is doubly so when it is remembered that timely detection of the early danger signals and immediate application of a means of treatment, neither difficult of application nor costly, will, in the great majority of cases, remove the danger and permit a happy termination to the pregnancy. The immediate placing of the patient upon a milk and water diet rigidly maintained works a rapid change for the better; and when this is associated with certain means which any doctor can employ the outlook brightens like a sunrise. At the same time the condition is a very treacherous one, or, rather, our knowledge of it is incomplete, and the unexpected often happens, a fact which calls for intimate supervision even after the disappearance of the danger signals. Further, one single signal may indicate as dangerous a state as several.

PRESSURE EFFECTS

Another group of danger signals is connected with what is called pressure. Either because the child is very large or because it is situated so as to press injuriously upon the internal organs of the mother, or because there are two children, or by reason of the woman's bones being small and her canals narrow, or on account of overdistention of some of the parts near to the womb, as, for example, of the bowel from constipation; for one or other or for several of these reasons conjoined, sensitive or important parts of the mother's body are compressed and hampered in their action with resulting suffering or discomfort. The group of danger signals thus constituted contains swelling of the lower limbs, especially of the feet, in the latter part of the day, the presence of varicose veins, troublesome piles, bearing down pain, obstinate constipation, a feeling of weight and tiredness in the back and lower limbs, impeded locomotion, and dyspepsia, with or without vomiting. Pressure phenomena account for a large number of the cases in which one recognizes discomfort rather than danger in

the months of expectancy; at the same time risks are lurking in the background always, and when the condition is associated with, say, the danger signals of toxæmia in addition, a state of matters of great gravity arises. One is glad to be able to say that pressure symptoms are nearly always capable of marked amelioration by means which are very simple of application. Probably no single plan of treatment yields more immediate or more completely beneficial results in practically every case than the soap and water enema properly given. Aperient medicine given by the mouth loses its effect after a week or two and it may also encourage dyspepsia; the enema is continuously effective and does not upset digestion. There are, of course, other means of relieving pressure well known to medical men or women and these are not to be omitted; but the enema is an outstanding boon.

THE "VENEREALS"

The venereal diseases have their own danger signals which they exhibit in pregnancy. Unfortunately they are not very obvious. In the case of syphilis a past history of repeated abortions accompanied by one of skin rashes, shedding of the hair, sore throats, and once upon a time the presence upon the genitals of a hard pimple which became a very slowly healing sore should always arouse suspicion. Fortunately there is a means by which this suspicion can be dissipated or sadly confirmed; this means is the testing of the blood. It is, however, a little unfortunate that pregnancy masks this test in a good many cases. A slightly positive result means more in the expectant than in the non-pregnant state and a positive one is very conclusive; a negative does not absolutely exclude syphilis. It is of great importance to proceed at once to treatment, and one is fortunate nowadays in having very effective newer remedies to supplement the old-fashioned but still most valuable mercury. The danger is really very great; the only expectant mother whom the writer lost in the last five hundred cases with which he dealt at the Antenatal Clinic and in the Prematernity Wards was a woman who had severe toxæmia, convulsions, and a positive Wassermann reaction of the blood. And for the unborn infant the risks of death, deformity, and disablement are terrific. The malady of the parents strikes the progeny with a crushing blow. The day is coming when syphilis shall be as rare in Great Britain as rabies now is; but that day is not yet.

The other venereal disease, gonorrhœa, throws out indications of its presence which in a certain class of patients may pass unnoticed or at least unheeded. They consist in a yellowish discharge with difficulty, pain, and frequency in passing water. There may be also warty growth. The disease, which is contagious, is due to a microbe, and the detection of the microbe in discharges leads to a certain diagnosis; without this bacteriological discovery the malady cannot be positively affirmed. Every discharge in the expectant state does not point to gonorrhœa and frequency in passing water is merely a slight pressure effect, so one has to be careful in rushing to conclusions, but one cannot go wrong in rushing to a doctor for diagnosis. The disease is not immediately dangerous to the mother, but it becomes so in time and it may lead at once to sterility; to the child it is not death-dealing, but it is blindness-producing, and who shall venture to say that is not almost as bad? It is a misfortune that medical means of curing gonorrhœa in the female are not quite satisfactory; but a good deal can be accomplished, and certainly blindness of the child may be almost absolutely prevented.

DANGER SIGNALS DETECTED ONLY BY THE DOCTOR

The various danger signals of the pregnant state have not all been enumerated, for fainting fits (often indicating heart trouble), shortness of breath (pointing sometimes to lung and sometimes to heart defects), neuralgia, inflamed gums, and many other things have not been mentioned. They will, nevertheless, be kept in mind. It is necessary, however, to refer—it must be very briefly—to the danger signals which the medical attendant detects at his visit of supervision upon the expectant mother. The presence of such danger signals has often been unsuspected by the mother, or, rather, their significance has been missed. The doctor, like his patient, recognizes the various indications of risk that have been already described; but there are others which only his practiced touch or eye can discover and rightly estimate. Some of these refer to pregnancy, but most of them are conditions which become dangers only when the confinement is in progress. The risk in their case is a postponed one. None the less it may be a great one both to mother and to child. Reference is here made chiefly to narrowness of the canals through which the infant has to pass or to unusual bulk of the child so trying to pass; and the doctor by his

measurements and by methods of comparing the canals with the child is able to discover the degree of disproportion and also to devise means whereby it may be overcome and safety restored. Such incompatibilities are not without danger signals recognizable by the watchful, expectant mother, such as the phenomenon of "carrying the child high," but she, unless unusually well informed, fails to understand their meaning. So in most cases she must depend upon the medical man's skill both for the detection and for the correction of these danger signals and their consequences.

THE WAYS OF ESCAPE

The list of danger signals has been formidable, but I trust that it has been noted that so many of them have been described as preventable, even as easily curable. In a great many instances detection is almost equivalent to correction; and therein the health reformer must draw great comfort. This being so, duty comes to be plain. It consists, in the *first* place, in informing all expectant mothers of the exact state of matters, of persuading them that ignorance is almost ineffectual defense against danger, and of convincing them that there is real safety in understanding themselves to the extent of being able to know when to go to a doctor for help. In the *second* place, it is essential that the mechanism be provided whereby the expectant mothers of the population shall be brought into touch with the means for the detection of their ailments and for the measures to be taken for their cure or, better still, for their prevention altogether. In modern language and in modern practice such means consist of the skilled supervision of pregnancy at antenatal clinics by expert doctors and nurses and by trained and experienced midwives of the provision of prematernity beds in hospitals for the reception and treatment of the diseases associated with pregnancy which are too dangerous to be dealt with in the patient's own home; and of the multiplication of maternity hospitals and maternity nursing homes wherein everything that can be done to make confinements safe and without evil after-consequences shall be done. When the expectant mother is well enough off to be able to afford to have the expert supervision and speedy attendance of her own doctor during the nine months of pregnancy and the month or so occupied with the delivery one may feel acquitted of responsibility in her case. But for many working women no such arrangements are

possible and for them something more generous must be devised. This has been in part furnished by maternity benefit under the National Insurance Acts; but much more remains to be done before the expectant mother can be regarded as sufficiently cared for from the time of conception up to the hour when, fully recovered, she can resume her place as materfamilias and queen of the little country called a home. To protect the homes of England and to preserve in health and strength the women in them is no less important a task than to provide navies and armies and an air force to safeguard the land as a whole,

> "This fortress built by Nature for herself
> Against infection and the hand of war."

And it will cost only a small fraction of what is spent on the latter task to perform magnificently what is involved in the former.

CLINIC

By THOMAS KLEIN, M.D.
Philadelphia

CASE OF MITRAL DISEASE, AURICULAR FIBRILLATION AND PULMONARY TUBERCULOSIS

Gentlemen, I wish to show a case of great interest because of its rarity. In going over this man's history I find that since an attack of influenza in October, 1918, he has been coughing, expectorating, losing weight, is short of breath, associated with pains in the chest, hoarseness and slight elevation of temperature at times. During this time he has lost 31 pounds. In the past you will note that during childhood he had an attack of acute polyarticular arthritis. In addition he has had one attack of acute plastic pleurisy and pneumonia. He was also operated upon nine years ago for a fistula.

As you will readily understand, the history in this case possibly points to a combination of cardiac and pulmonary disease. Upon examination you can see that the man is poorly nourished, has slight cyanosis of the lips and finger tips. Dyspnœa is an important factor. His chest had best be described as flat in type. There is marked atrophy of the upper portion, especially around the clavicles and scapulæ upon both sides, but greater on the right. The expansion is again decreased over these areas; greater on the right than on the left. Remembering when in doubt as to the amplitude of excursion it is best to observe the movements from behind. And again when in doubt put marks below the clavicle upon the anterior portion of chest. These are to be placed symmetrically upon each side, and again observe your chest movements from behind and note which spot comes into view first.

Expansion is decreased in three ways: (1) Delay in time of starting, which usually signifies a recent or early inflammatory lung process. (2) Decrease in amplitude: significant of an old lesion such as a chronic plastic pleurisy. (3) A combination of these two such as you have in this case and is interpreted as an old fibrosis in the apices. The diaphragm on both sides is apparently moving freely.

Litten's Phenomena being present on both sides. Upon inspection of his heart you see the apex beat in the fifth interspace two and one-half centimetres to the outside of the left mid-clavicular line. You will notice that it is rather forceful in character and very irregular. Upon palpating his radials we again notice the irregularity. The walls of the arteries are about normal for a man of this age and are easily compressed. It is a low-pressure pulse. This man's blood-pressure is: systolic, 110; diastolic, 67. Tactile-fremitus is increased over the right upper and left apex. Percussion note on the right side is moderately dull down to the third rib, the remaining part of his chest being hyper-resonant. Percussion of his heart shows a marked increase in the transverse diameter. The left border corresponds to a point twelve centimetres to the left of the mid-sternum; the right border corresponds to the right parasternal line. Upon auscultation of his lungs we hear over the right upper lobe and the left apex typical bronchovesicular, harsher on the right than the left. Associated with this are many subcrepitant râles. Vocal resonance is increased down to the third interspace on right side and to the second on the left. The bases of both lungs at this time appear to be entirely normal. Upon auscultation of the heart you will first judge the condition of your myocardium. Note the character of your heart sounds and their regularity. In this case the heart sounds have lost their snappy quality that you always associate with a normal heart. The marked irregularity will be the most prominent factor. In addition to the poor quality of your myocardium and your irregularity you will note at the apex a harsh systolic murmur, which is transmitted into the left axilla. Two weeks ago, when I first examined this man, his irregularity was not as great as at present and at that time there was in addition to the systolic murmur a presystolic, that of a mitral-stenosis. So that in this case we are dealing with double mitral disease, auricular fibrillation and that which would be interpreted under ordinary circumstances as pulmonary tuberculosis. But when we have such a condition we should be exceedingly careful of the latter diagnosis. In such cases depend principally upon the examination of the sputum. In this case we have four examinations, all of which were positive for tubercle bacilli. Now you may wonder why the presystolic murmur is absent at this time, but realizing that in cases of fibrillation our normal stimulus production centre has been thrown

out of commission and that now in the auricle we have many points of stimulus production and that our auricle is semi-dilated, quivering and at no time completely contracting. It is the contraction of the auricle forcing the blood through the narrow orifice that produces our presystolic murmur. If that contraction is absent the murmur must of necessity be absent as well. In cases of mitral-stenosis where an irregularity appears and the murmur disappears you can, with a great degree of safety, make a positive diagnosis of auricular fibrillation. Mitral-stenosis is the etiological factor in 60 per cent. of all rheumatic auricular fibrillation cases.

Mitral-stenosis and pulmonary tuberculosis are two diseases which are very frequently mistaken for each other. The reasons are frequent hemoptyses in poorly nourished individuals and the inconsistency of the presystolic murmur. In addition, in mitral-stenosis we always find a dilatation and hypertrophy of the left auricle with the subsequent compression of the left apex. In this way unless the heart be very carefully scrutinized, in connection with a past history of streptococcic infection, an error in diagnosis can be made because of the findings at the left apex due to compression.

As to treatment this man has been listed for the state sanatorium, where he will get his rest, fresh air and good food. In addition, he should have doses of digitalis in sufficient quantity to cause a marked slowing in his pulse or a complete recovery from his auricular fibrillation. The rest may be all that is needed. In giving digitalis in cases of auricular fibrillation it is well to give fairly large doses until you have digitalized your heart. Then cut down on the drug and give small doses in sufficient quantity to maintain the desired effect. Fibrillation with a pulse rate, or, better, a heart rate of 100 or below, without symptoms of loss of cardiac reserve does not need digitalis. When it is necessary to keep your heart rate at this level by the aid of the drug, then your prognosis becomes correspondingly more grave.

SINGLE PULMONARY ABSCESS FOLLOWING TONSILLECTOMY

This patient is twenty-three years of age and has been ill since 1913. In 1910 he had an attack of pneumonia and pleurisy which was only of short duration. After this he completely recovered but was subject to frequent colds. In 1913 he had his tonsils removed, and since that date his general condition has been about the same as

you see it at present. He is coughing and expectorating a large quantity of very foul muco-purulent expectoration, which, as you see, separates into three distinct layers; the upper layer being grayish in color, the middle layer is clear, while the third layer is much denser and of a higher specific gravity than the other two layers. The odor is distinctly fetid. The patient tells us that in the mornings and upon a change of position he will expectorate large quantities of this material, after which he is comparatively free from expectoration for a few hours. His breath is again fetid, and, as you will readily agree, is very offensive to all who come in contact with the patient. In addition to the above symptoms the patient has lost fifteen pounds in weight, is short of breath and very easily tired out. There has been a constant absence of any blood in his sputum and no gastro-intestinal manifestations of toxæmia.

Summing up our history we note that this patient, after an operation on the upper respiratory tract, developed cough, fetid expectoration, which separates into three distinct layers, and other manifestations of a severe toxæmia. We should first of all think of a possibility of a lung abscess or pulmonary gangrene. Since this process has gone on for approximately seven years we would expect nature to have localized the gangrenous process in the form of an abscess. From physical examination of this man I do not think that you would be able to make such a diagnosis. The findings at present are those of a thickened pleura at the right base, binding down the lower portion of that lung, underlying which is a lobar bronchitis. In addition, there are a few vague findings at the right apex which could possibly be interpreted as an old fibrosis. His heart is normal in size and position. Heart sounds are regular but lack the snappy quality of a normal heart. There are no evidences of endocarditis. The second pulmonic sound is accentuated. Eight sputum examinations have all been negative for tubercle bacilli. Wassermann reaction is negative. An X-ray examination made of this patient while in the Polyclinic Hospital in 1919 revealed the following facts: Area of consolidation in the lower lobe of the right lung approximately three inches in diameter; the outlines are very irregular and diffuse into the surrounding parenchyma; the diseased area demonstrates a central cavitation. This was thought to be unquestionably a gangrenous process affecting the greater portion of

the right lower lobe. In addition there was peri-bronchial thickening with diffused haziness and numerous patchy areas of mottling throughout both lungs. A recent X-ray made on this patient shows practically the same thing, with the exception that the process now is less dense and the cavity much smaller than upon preceding occasions. Taking into consideration the history, the physical findings of a thickened pleura and a lobar bronchitis, plus the character of the expectoration, the absence of tubercle bacilli and the X-ray examination, I feel that we are justified in making a diagnosis of pulmonary abscess probably following tonsillectomy. As you will remember, the etiological factors in such cases are:

First, Lobar pneumonia.
Second, Operation on the upper respiratory tract, especially tonsillectomy.
Third, Broncho-pneumonia.
Fourth, Vegetative endocarditis with pulmonary infarct.
Fifth, Suppuration within the abdominal cavity.
Sixth, Manifestations of a general septicæmia.

If you have a case of lobar pneumonia which does not recover within the expected time, and the patient becomes more toxic and his temperature more irregular, associated with a fetid expectoration, ofttimes streaked with blood or even a frank hemorrhage and with an increase in his leucocytes, always suspect a beginning gangrenous process in that man's lung. As in this case, the history and the character of the sputum are far more important for the arrival of a correct diagnosis than are the physical findings. Unless this abscess formation be near the surface of the lung, it is very doubtful whether we would get the signs of cavitation. The findings are more apt to be those of a consolidation or a dense infiltration. These are again often partially obliterated by an overlying thickened pleura.

These cases practically always terminate in one of three ways. Often they will rupture into a bronchus, and if their position is such that they will have good drainage, will, in a vast majority of cases, heal. Second, when the abscess is situated near the surface of the lung, the inflammatory process will extend outward, setting up an adhesive pleuritis. The abscess may later rupture through the chest wall, giving us a fistula or possibly acting as the cause of a subdiaphragmatic abscess. If the pleuritis is not adhesive the abscess may rupture into the pleural space, producing a pyo-pneumothorax.

Third, if the abscess is in the parenchyma of the lung, and especially in the dependent part, it may progress, as in this case, producing a dense fibrosis throughout that portion of the lung.

As to treatment, there are two procedures from an operative standpoint: First, if seen early, before pleural adhesions have formed, artificial pneumothorax is the procedure of choice. Second, a two-stage operation may be resorted to. The first stage is done for the purpose of producing an adhesive-pleuritis. After this has been done a tube is inserted directly into the abscess cavity, which then can be drained in the ordinary manner. Medically, with the exception of placing the patient in proper position to favor drainage certain hours each day plus general systematic treatment to build up the patient's resistance, nothing can be done. Pulmonary disinfectants in the form of creosote or some of its derivatives may be utilized with advantage, but these are secondary to postural drainage, fresh air and lots of good food.

CASE OF PATENT DUCTUS ARTERIOSUS

The next case I wish to call to your attention is that of a girl twenty-two years of age, white, milliner by occupation. She was perfectly well until September, 1918, when she had pneumonia followed by a pleurisy. She recovered completely from this illness and remained well until June of 1920, when she developed slight cough, dyspnœa, became easily tired and lost a few pounds in weight. The highest weight being 119 pounds, and at present she weighs 114. In addition, there is slight pain in the chest over the left lower infraclavicular region. She has at times had a slight elevation of temperature, but this has not been a constant feature. She does not have any gastro-intestinal symptoms. She has never expectorated blood nor had night sweats. There is notable absence of any contact during her early childhood life.

Looking back on the history, it is rather indefinite and one which would naturally lead one to look upon the case from the history standpoint of a probably post-influenzal condition. However, upon examination we find a most interesting condition—that of a patent ductus arteriosus. Upon examination of her chest we see that she is well developed and, for her stature, well nourished. We notice a remarkable absence of cyanosis of the fingers, lips and ears. Clubbing of the

fingers is also absent, findings which are usually present in this condition. Further examination of the lungs practically reveals them to be entirely normal, so that we will not take up further time in dealing with that phase of the case, but will direct our attention immediately to the heart. The apex beat is visible and rather diffuse in character. It is regular. Upon palpation it is localized in the fifth interspace outside the nipple line. Upon palpating over the pulmonic area you will feel a systolic thrill. This is absent over the aortic area. Upon percussion we note that the right ventricle is enlarged. In addition to that we have a definite widening of our cardiac area in the second interspace to the left of the sternum. Auscultation reveals the heart to be regular and the muscle quality good. Over the mitral area there is an absence of any murmur. As we progress upward over the pulmonic area we hear a combination murmur; one which starts in systole and is carried through the entire diastole of the heart. The systolic murmur is the shorter of the two, the diastolic being very much harsher and much prolonged. The systolic murmur is transmitted upward to the left. In this case it is not transmitted up into the left carotid as is a common area of transmission. It is, however, transmitted into the back between the scapulæ. The second pulmonic is markedly accentuated. Over the aortic area we hear a first and second sound of good quality. Here the murmur is absent and the second sound is transmitted well into the vessels of the neck. As you will remember from your embryological studies, the ductus arteriosus is that fetal structure which joins the left branch of the pulmonary artery with the aorta and carries the unaerated blood from the upper extremities and the head to the placenta. This structure normally closes at birth or soon thereafter. It is notable that these conditions will go on unrecognized and without symptoms for many years.

In the army I had the opportunity of examining a medical officer who had graduated from one of our best medical colleges and who never knew he had cardiac disease until he was examined for overseas duty, when a patent ductus was discovered. The murmurs in these cases are characteristic. It is a combination systolic and diastolic murmur heard best over the pulmonic and to the left of the pulmonic area. It is the longest murmur that you will hear in any cardiac condition, with the possible exception of that murmur which

is produced by an opening in the intra-ventricular membranous septum. Here, however, the murmur is heard over the third and fourth interspaces to the left of the sternum and is not transmitted. In cases of pulmonary-stenosis the findings are entirely different. In pulmonary-stenosis we have a general cyanosis, associated with marked clubbing of the fingers; this, you will note, is entirely absent in this case. You will feel a systolic thrill in the pulmonary stenosis the same as you do in this case. The murmur, however, will be systolic in time, while here the predominating murmur is a diastolic. In addition, the second pulmonic sound in the cases of pulmonary-stenosis is decreased, while in this case it is markedly accentuated. Right ventricular hypertrophy will coexist in both condition, but to a greater degree in pulmonary-stenosis. The X-ray findings in this case show a definite enlargement of the heart in the transversed diameter. In addition, the shadow cast by the enlarged pulmonary artery is definitely shown. Autopsy on such cases have in several instances shown a dilatation and hypertrophy of the pulmonary artery. Owing to this fact, we have an increase along the cardiac area to the left of the sternum in the second interspace.

As to treatment of the cardiac lesion there is at present no indication. The myocardium is good and there are no indications for cardiac tonics or stimulants.

I do not feel that we should curtail this girl's daily activities, but would advise her to continue a normal life. It is of interest to note that she gave birth to one child without any cardiac symptoms whatsoever. Her general condition, however, demands attention, and I believe that her symptoms are all due to her general condition and her secondary anæmia. For this she will be given iron and arsenic, plus additional rest and extra nourishment.

SURGICAL CLINIC

By EMIL G. BECK, M.D., F.A.C.S.
Surgeon to the North Chicago Hospital, Chicago

I. Bilateral Empyema, Complicated by Childbirth During Attack of Influenza.
II. Carcinoma of the External Ear; Combined Surgical and Radium Treatment.
III. Epithelioma of Lower Lip; Combined Surgical and Radium Treatment.
IV. Infected Dermoid Sacral Cyst; Excision; no Suture; Skin Regeneration Aided with Adhesive Strips.

I. BILATERAL EMPYEMA; DRAINED SIMULTANEOUSLY; COMPLICATED BY CHILDBIRTH DURING ATTACK OF INFLUENZA

This woman is thirty-six years of age, and returns to-day for examination of her chest, nearly two years after a bilateral empyema had been drained.

During the epidemic in the spring of 1918, she was taken with severe influenza which developed into a bilateral pneumonia, with pleural effusion on both sides. The house physician repeatedly withdrew small quantities of pus from the right pleura. She was then in the eighth month of pregnancy, and gave birth to a normal child while both pleural cavities were filled with pus. Both survived, a rather rare occurrence, for nearly always the mother and the child die in such a case.

I saw her first on December 21, 1918. She was in a deplorable condition—temperature, 103°; pulse, 140; respiration, 40. Temporary relief was obtained at this time by the introduction of a catheter in the eighth intercostal space on the right side in the posterior axillary line; she rallied so that on the 11th of January I was able to perform a resection of the eighth rib posteriorly, introducing a large tube for drainage (Fig. 1). Stereoröntgenograms taken at this time showed that there were multiple abscesses on the left side as well as an accumulation of pus and with pneumothorax in the right pleural cavity (Fig. 2). Temperature at this time varied from 99 to 101°; pulse, 130 to 150; respiration, 40.

On January 14th, a second operation was performed, this time on the left chest, carried out as follows:

A section of about one inch of the eighth rib was resected posteriorly under local anæsthesia. The pleura was exposed and incised about one-half of an inch. Before any air could enter the pleural space the index finger was pushed through into the pus cavity, thus entirely blocking the opening against entrance of air. A curved artery forceps was then inserted along the index finger and directed anteriorly and downward toward the lowest recess of the empyema cavity. By pressing the point of the forceps against the inner chest wall, between the ribs, the skin bulges and indicates the place for counter incision, which is quite easily made under local anæsthesia by the assistant. A soft rubber catheter (No. 12 or 14) was then grasped with the forceps and pulled through. The distal end of the catheter must fit snugly in the counter-incision, so that no air can enter along the outside of it, and the proximal end protrudes through the opening of the resected rib. This catheter has three or four small openings near the centre. A large size rubber tube was then slipped over the catheter and introduced into the drainage opening (the seat of the resected rib); the skin was sewed all around the rubber tube, so as to make it also air-tight. A glass connecting tube was then fitted into the large rubber tube, which drained the pus into a flask, either through suction or gravity. The patient was allowed to sit in a recumbent position in bed immediately after the operation. Four days later the large tube was removed; the catheter remained for another two weeks draining the cavity from both openings. By this time the discharge had greatly diminished, and we were ready for a new step in the after-treatment.

A tape about one-quarter of an inch in width was attached to one end of the catheter by means of a silk thread and the catheter was withdrawn, thus pulling the tape into its place. This tape then served as a drain for the cavity, similar to that of a "seton." The tape is soaked in a 20 per cent. argyrol solution before its introduction. This tape was left in the cavity until the discharge of pus ceased. Such has been the result in practically all cases in which this method had been employed.

The same operation was then made on the right side as illustrated in Fig. 1. Injections of bismuth paste were used in both empyema

cavities and the patient's temperature soon became normal. She gained in weight and strength, and the sinuses closed four or five weeks respectively after the second operations and both have remained closed to date. Very nearly two years have now elapsed, and upon examination to-day we find the patient's condition remains the same (Fig. 3). There is free expansion of both lungs.

In the radiogram of the chest taken to-day we find expansion of both lungs, and very little to show that a bilateral empyema had existed. The case teaches several lessons:

1. That in bilateral empyema the operation on both sides should not take place at the same time.
2. That reëxpansion of the lung may take place after proper precaution against allowing the entrance of air during the first week of the drainage period.
3. That the double or counter-drainage is a very effective method of draining such cases.
4. It is possible for a pregnant woman even with such extensive affection of influenza to give birth to a normal child, and both to survive.

II. CARCINOMA OF THE EXTERNAL EAR; COMBINED SURGICAL AND RADIUM TREATMENT

This man, fifty-three years old, presents himself with an ulcerating tumescence which involves the temple region and the ear on his right side. It is progressive in character, the growth having started some two years ago. It was then operated, diagnosis of carcinoma made and for eight months there was no recurrence. The growth then began to reappear until it has reached its present extent. You will note that it involves the concha of the auricle, the tragus and the outer part of the external auditory meatus (Fig. 4). There is no involvement of the glands in the neck as yet.

It is essential in a case of this kind to make a radical excision of all structures involved, no matter how unsightly the external ear may be after the operation, for we know that recurrence in these cases, which usually involves the deeper structures, such as the parotic gland, is practically incurable.

We, therefore, remove more than seems absolutely necessary. We start by making a circular incision in front of the ear, beginning at the upper part of the helix, carrying same outwards and downwards half

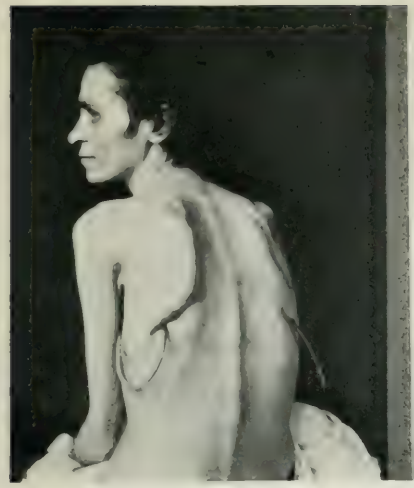
an inch beyond the margin of the growth to the lobe of the auricle. We remove now the anterior part of the helix clear down into the triangular fossa, and remove also the external one-half of the auditory meatus (Fig. 5). This excision leaves a denuded surface the bottom of which may not be entirely free from the growth. But we are planning to apply radium directly into this open field with the expectation that the immediate contact of the radium with the tissues, without much screening will destroy all the malignant cells that may have remained.

A pathological report of the tissues removed gave the finding as: Carcinoma, squamous cell.

Later History.—Two radium needles each containing 12½ milligrams of radium element—screening $^1/_5$ mm. of platinum—were placed side by side into the wound and left in for twenty-four hours. This was repeated a week later for twelve hours. Within one week after the last exposure, the patient's entire left ear became greatly swollen, œdematous and cyanotic. It was three times its normal size and for a time it looked as though the tissues would break down and that he would lose the entire external ear. This reaction was due to the action of the radium being placed so near to the external ear which had already lost to a great extent its circulation. Fortunately after the healing began to take place, the ear resumed its normal color and softness. The cancer bed became first covered with a grayish white membrane similar to that of a diphtheritic membrane. When this membrane was peeled off it would leave a very healthy looking granulating surface. The skin gradually grew from the edges of the wound toward the centre, and with the aid of adhesive plaster strips applied along these wound edges on alternating days, the entire area became gradually covered with apparently normal skin. The operation was performed on October 14, 1919, a year ago, and up to date there are no signs of recurrence (Fig. 6).

Comments.—In the recurrent cases of deep-seated carcinoma, it is of great advantage to remove the overlying structures, especially the skin and as much as is feasible of the tumor itself in order to expose the cancer field to the direct action of the radium rays. By closure of the wound with skin and muscle sutures, we interpose a filter of living tissues through which the rays must pass to reach the

Fig. 1.

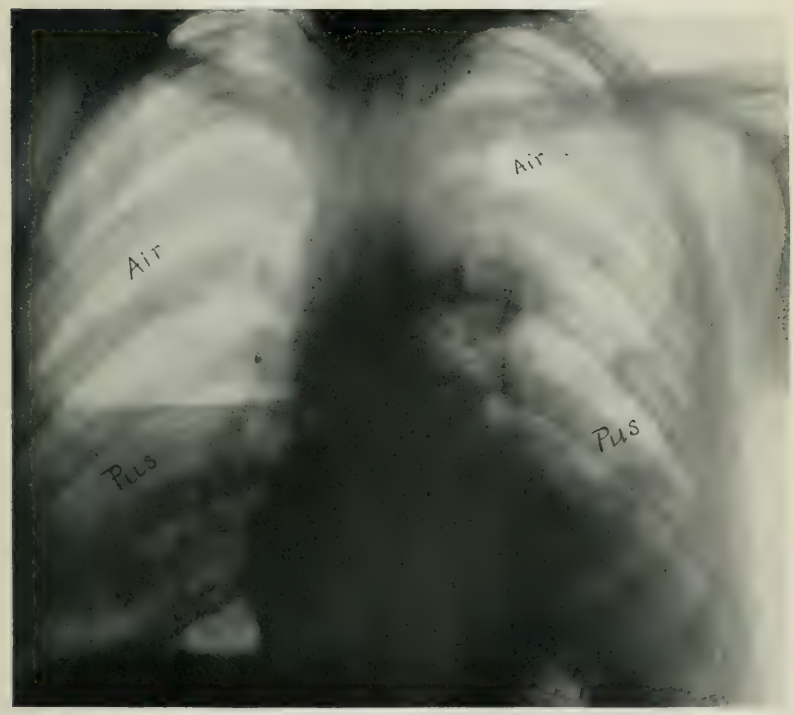


Bilateral empyema contour-drain.

Fig. 3.

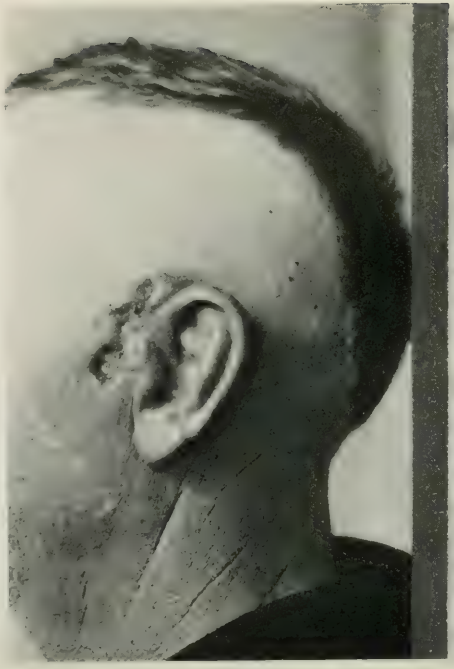
Two years after drainage. Both lungs reëxpanded.

Fig. 2.



Bilateral empyema.

Fig. 4.



Recurrent carcinoma of external ear.

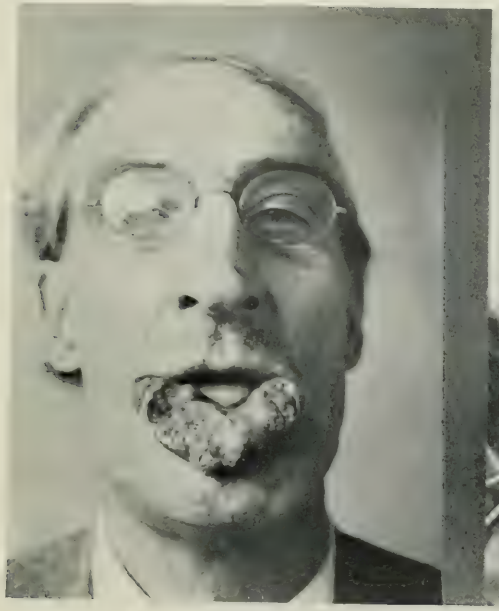
Fig. 5.

Excision of tumor and part of external ear. Wound left open for radium.

Fig. 6.

Wound healed; no recurrence; one year.

Fig. 7.

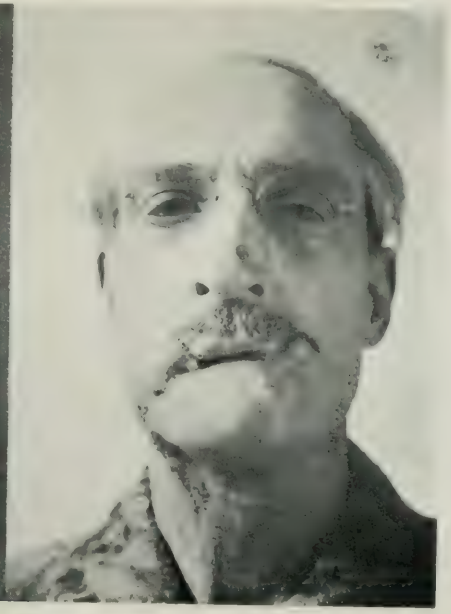


Epithelioma of lower lip.

Fig. 8.

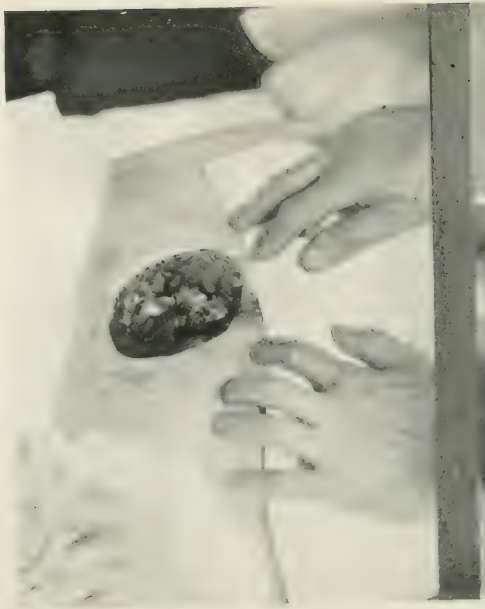
Introduction of radium subsequent to operation.

Fig. 9.



Patient able to close mouth; no plastic operation performed.

Fig. 10.

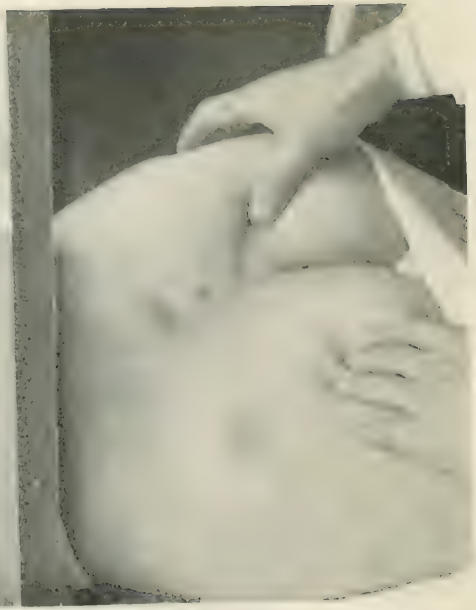


Excision of sacral cyst, leaving wound gaping.

Fig. 11.

Wound filling up with granulation. Skin healing over denuded surface.

Fig. 12.



Complete closure. Redundant skin covering surface

cancer depth and thus the skin and other overlying tissues absorb the most active gamma rays.

With this procedure, we also avoid the radium burn, which is one of the drawbacks to the radium and X-ray treatment and a constant dread to the surgeon.

Skin will not grow from the edges of the wound over a cancer surface. Whenever the epithelial cells spread over a denuded surface from which the carcinoma was removed, we may be assured that all cancer cells have been destroyed in that particular field.

III. EPITHELIOMA OF LOWER LIP; COMBINED SURGICAL AND RADIUM TREATMENT

This man is fifty-three years old and presents himself for treatment of a large ulcerated growth involving his entire lower lip. You will note that the growth has invaded both angles of the mouth, and the entire lip has lost its original contour. He is unable to close his mouth so that the saliva is constantly dripping and the tongue most of the time is protruding (Fig. 7). There is an enlarged gland in the right submaxillary region.

Previous History.—A small ulcer first appeared in August, 1919, on the margin of the muco-cutaneous surface until it reached its present size. It was first diagnosed as syphilis; but anti-syphilitic treatment produced no result. Wassermann tests were negative. He has lost twenty pounds in weight during the past year.

Examination reveals an indurated growth with extensive ulceration involving the entire lower lip and extending to the gingiva of the lower jaw. Laterally we feel a nodule extending into the right cheek but none in the left. There are no other metastases to be found anywhere in the body.

Diagnosis.—Epithelioma in advanced stage, in the lower lip with involvement of regional glands in the right side of the neck.

Treatment, carried out by Dr. B. G. Katz. In a case like this, we cannot be too radical in our procedure; it is better to take some of the healthy tissue beyond the growth than to leave small portions of the tumor behind.

Our plan of reconstruction of the lip after its excision is to utilize a portion of the upper lip which is quite pliable. This plastic reconstruction will, however, be postponed until we are certain that

every vestige of the carcinoma has been eliminated. We, therefore, remove the entire lip and include a margin of about one-fourth of an inch beyond the borders of the healthy tissues. The nodule in the right cheek is excised and all the tissues external to the lower maxillary bone are divided carrying the incision downwards and externally toward the lymph-glands. We dissect all of the glands, including the submaxillary, in the submaxillary triangle, and after suturing the tissues we leave a channel underneath for the introduction of radium capsules, as shown in Fig. 8.

You will note that we have left the entire surface from which the tumor has been removed, exposed. This was done purposely to facilitate the application of the radium directly within the cancer bed. If there is any benefit to be derived from the radium, let us put it in direct contact, if possible, with the tissues in which there is likely to be cancer cells left. If we cover these with normal skin, we have covered up the seed for recurrence, and at the same time put a barrier in the way of proper application of radium and X-ray. Thus far we have applied the radium in 50 milligram doses for four or five hours at a time, with only 1 mm. of brass screening. This is being supplemented with X-ray exposures of four minutes with rays of medium penetration with a spark gap of about eight inches. As soon as we are reasonably sure that recurrence is not going to take place, we shall proceed to perform a plastic operation for the reconstruction of the lower lip; but since the man can close his mouth now, as shown in Fig. 9 and has been gaining in weight, because he can take more nourishment, we shall delay this plastic operation for four to six months, because if in this period no recurrence takes place, the chances for recurrence are minimized and the success of the operation more certain.

IV. INFECTED DERMOID SACRAL CYST; EXCISION; NO SUTURE; SKIN REGENERATION AIDED WITH ADHESIVE STRIPS

History.—This patient, a young lady of twenty-seven years, returns to-day, three years after the last operation, for dermoid cyst of the sacrum. I first saw her in March, 1917, when she gave a history of having had three operations for a dermoid cyst at one or two years intervals; but in spite of these operations the suppuration had persisted.

The first evidence of any trouble was noticed when she was about nineteen years old, when a small lump appeared at the junction of the sacrum and the coccyx which opened spontaneously. It was first taken for a rectal fistula; but upon opening the same the usual contents in dermoids of hair and fatty material were found.

A radical excision was then performed by a Chicago surgeon. The wound closed but reopened spontaneously three months later. Another operation was performed, and the wound again sutured, with the same result of persistent suppuration. Two years later a third operation, though more radical than the first two, was also without avail.

Operation.—I concluded that it would be best to treat it with the open method, and on May 5, 1917, I excised all structures down to the sacrum in an area four by five inches in diameter, and removed every vestige of what appeared to be remnants of the dermoid sac.

On account of the thickness of the adipose tissue of about two inches, there was a deep clean-cut cavity. No attempt was made to make the wound any smaller by bringing the edges of the skin closer together; on the contrary this cavity was packed with gauze which rather separated the wound edges (see Fig. 10).

Subsequent Treatment.—The dressings were changed every twenty-four hours by repacking the cavity and we could observe that the wound was contracting rapidly and the cavity was filling up with normal granulation tissue from the bottom. New epithelial growth gradually began to grow from the edges of the clean-cut skin wound, and within three weeks the wound was reduced to the size as shown in Fig. 11, new skin having then grown about 2 centimetres all around the circumference. The regeneration of the skin was favored by pasting narrow strips of adhesive plaster around the margin of the wound in such a manner as to cover both the granulations and the skin borders. The epithelium will grow along the under surface of the plaster with great rapidity, and large denuded surfaces may thus be covered without the use of skin grafts. Within another month the entire granulating surface was covered with skin more pliable than on any other part of her body.

There has been at no time any recurrence of the suppuration since the time the operation was performed (see Fig. 12).

I have carried out this method of treatment of dermoid cysts in a series of seven cases, each of them having had a number of previous operations and in five out of the seven cases, the results were similar to this one, and in two of them not successful. The reason for failure was the circumstance that the disease had extended into the pelvis proper.

This procedure need not be employed in every case of dermoid cyst for we know that many will heal promptly if the sac is removed; but in cases where the first operation is not followed by permanent closure, it is safer to treat it by the sutureless open method as demonstrated in this case.

CLINICAL TALKS ON SURGICAL SUBJECTS

By CHARLES GREENE CUMSTON, M.D.

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I. Foreign Bodies in the Œsophagus.
II. Enterorrhagia in Hernia; its Pathogenesis, Prognosis and Treatment.
III. How to Puncture Joints.
IV. Superficial Dural Cysts Following Cranial Injuries.
V. Intraperitoneal Collections of Bile Without Apparent Lesions of the Biliary Tract.
VI. Ankylosis of the Lower Jaw; its Surgical Treatment.
VII. Post-Traumatic Convulsions and Tremors and Paralysis Agitans Following Traumatic Nerve Trunks.

I. FOREIGN BODIES IN THE ŒSOPHAGUS

An external œsophagotomy is to be done on this little four-year-old girl who a year ago swallowed a solution of caustic soda which resulted in a stricture of the œsophagus, although this has been kept very patent by the regular passage sounds. But unfortunately the other day the child continuing her feats in deglutition swallowed a piece of glass which has become lodged in the stricture and cannot be removed by any other procedure of lesser magnitude.

When surgical measures are necessary for the removal of foreign bodies lodged in the œsophagus external œsophagotomy is the most common procedure. You make an incision on the left over the spot where the œsophagus overlaps the trachea unless there are some special contraindications. The projection caused by the foreign body is sometimes a very useful guide for revealing the œsophagus at the bottom of the incision. When you are in doubt as to the œsophagus always introduce a sound and then cut down on it.

This operation not only allows you to remove foreign bodies in the cervical region of the tube, but in some cases those lodged in the thoracic portion can be extracted by the use of long slender forceps introduced through the incision and directed down the canal. When

this fails the stomach must be opened and the foreign body drawn down into it and removed, but this procedure will be rarely indicated in practice.

When external œsophagotomy is to be done it is essential to operate early and always immediately when inflammatory phenomena or a hemorrhage exist or when the nature of the foreign body renders attempts at extraction by other means dangerous.

Now, this is an operation that you may all be called upon to do and you should consequently be familiar with the surgical anatomy of the region in which you are to operate. Neglect of this leads to disaster and modern teachers of surgery should give far more attention to it in their lectures than they do. Consequently I will direct your attention to the surgical anatomy of the œsophagus, which for convenience clinically can be divided into three portions, the first being the cervical, the second the thoracic and the third the abdominal. Extending from the sixth cervical vertebra to the left side of the eleventh dorsal, the œsophagus has for its upper limit the lower border of the cricoid cartilage and the crico-thyro-pharyngeal muscle. Its lower limit is the edge of the serratus magnus muscle at which level the epithelium of the œsophagus unites with that of the stomach. Throughout its course the œsophagus lies on the spine, at first directly on it to deviate to the left of it where it is overlapped by the left bronchus, left bronchial lymph-nodes and pericardium.

Its cervical portion need only be considered from the viewpoint of œsophagotomy. This portion lies directly on the last cervical and first dorsal vertebræ, while in front of the gullet we have the membranous portion of the trachea. That much you must remember and also that in the middle line the œsophagus is the only organ between the trachea and the spine.

On each side there is the lateral lobe of the thyroid gland, the carotid artery, inferior thyroid artery and recurrent nerve, but when the gullet inclines to the left this nerve passes on to its anterior aspect, while the left carotid artery comes into closer proximity to it. The œsophagus is covered by the left sterno-hyoid muscle and you consequently must at once perceive the disadvantages offered by the anatomy of the region on the left side of the neck and why œsophagotomy might be easier on the right, although the organ is otherwise more accessible on the left side.

The œsophagus is surrounded in its entire length by a loose connective tissue of a serous nature so that it can slide over the adjacent structures with ease; but the tube is less movable in its cervical portion because in this region the connective tissue is somewhat more condensed. A number of lymph-nodes are encased in this connective tissue, especially at the bifurcation of the trachea.

Both pneumogastric nerves lie upon the œsophagus and form an anastomotic network around it. At its upper portion the left pneumogastric nerve is in front of the gullet, the right nerve being behind, but surgically you need not pay attention to this distribution because these important nerves are out of the field in œsophagotomy.

When the œsophagus is exposed in the living subject it offers a pinkish gray color, while its surface is smooth and shining like a serous membrane. Its walls are firm and about three to four centimetres in thickness. The tube is flattened on itself, the anterior and posterior surfaces being in contact with each other.

The arteries come in succession from above downwards, from the inferior thyroids for the cervical portion of the gullet; the bronchial arteries and even the aorta itself supply the thoracic portion while at its terminal portion the œsophagus is supplied by the coronary artery of the stomach.

The venous supply is more developed than the arterial and forms a plexus of meshes extending in the direction of the axis of the œsophagus, especially at its lower portion, between the connective tissue and fibromucous layer.

The lymphatics arise in the mucosa of the œsophagus and at first are closely united, especially near the cardia.

The nerve supply is derived from two sources, namely the pneumogastric and great sympathetic. The former furnishes the principal nerve branches, this being on account of the more intimate relationship of this nerve to the œsophagus. The sympathetic sends a few minute ramifications to the gullet in its thoracic portion.

Such is an only too brief outline of the anatomy of the œsophagus, but at least I have referred to the most essential points.

It is generally better to operate on the left side as I have already said, as the œsophagus projects more on that aspect, unless there is some special contraindication. The incision is made between the sterno-mastoid and trachea in just the same direction as that made

for ligating the common carotid. Start this incision at the top of the thyroid cartilage and carry it directly down to the sterno-clavicular joint.

Next retract the omo-hyoid muscle outwards or, if necessary, divide it. The large vessels, larynx and thyroid gland are retracted to the side but let me warn you not to injure these structures nor damage the thyroid vessels, thoracic duct or recurrent nerve. When the œsophagus has been freely exposed it is incised in a vertical direction. If you have any difficulty in recognizing the œsophagus simply introduce a sound and cut down on it.

As you see this technic, although quite simple, requires prudence on the operator's part and should be proceeded with carefully. As in all other operations, especially in the neck, it is better to ligate each vessel as it is divided in order to have a clear view of the field of operation.

II. ENTERORRHAGIA IN HERNIA

When the anatomical structure of the intestine in a strangulated hernia is considered and the starting-point of an intestinal hemorrhage and its manner of production are examined into, it is really surprising that this complication does not arise more frequently. It is, however, more than probable that enterorrhagia occurs in many cases of strangulated hernia, but the presence of blood is overlooked, either because of the small amount of digested blood present in the stools or because it is intimately mixed with the feces, so that it is only when it escapes in large quantity—in the form of a real hemorrhage that it is noticed by the surgeon, and then usually as a surprise.

Strangulation of the small intestine, with or without the presence of omentum in the sac, results in interference of the circulation in the gut and if not soon relieved ends in perforation or gangrene. Interference with the circulation and perforation presupposes congestion and ulceration, two phenomena eminently compatible with that of hemorrhage. Now, if we recall the experimental work on animals carried out by Jobert de Lamballe many years ago and the more recent ones of Labbé, Motte and Schwerringer in order to determine the various degrees offered by the intestinal lesions produced by strangulation; if at the same time we recall the histologic studies of Cornil, Bosc and Blanc, we learn that very intense congestion, quickly

followed by blood infiltration and hemorrhagic phenomena either on the surface or in the walls of the intestine are the principle pathologic characters arising at the very onset of the process.

At the level of the sulci which separate that portion of the gut remaining within the abdomen from the loop or loops strangulated in the hernial sac these pathologic phenomena attain their maximum of intensity and there set up ecchymotic rings which form a line of demarcation of the circulatory stasis. At a more advanced phase, these rings assume a grayish hue and offer a vague transparency which would seem to indicate a thinning of the walls of the gut, and in fact it is here that the ulceration of the mucosa begins and perforation takes place. Destruction of the gut takes place from within outwardly, progressively until it is complete.

In the space between the sulci on the strangulated loop, the lesions although less pronounced and regular are none the less evident and of the same type. Tense and hot, rendered blackish from the subserous blood infiltration, the internal surface of the gut becomes rough and frayed in spots by small blood-clots, covered by fibrinous exudate of varying thickness and thickened throughout the area involved.

The histologic lesions are, at the onset, an infiltration and progressive desquamation of the mucosa, the epithelium becomes granular and finally disappears, and lastly the villosities themselves. The glands become dissociated by diapedesis, the subglandular structures likewise become dissociated infiltrated as they are by leucocytes and lines of hemorrhage. These changes, especially dilatation of blood-vessels and blood suffusion, progressively disorganize the muscular and subperitoneal layers of the intestine.

You see, gentlemen, how primordial are the lesions of the blood-vessels; blood stasis, capillary ruptures and thrombosis from distension of the subserous vessels, all bringing about innumerable infarcts. These lesions are still more favored by bacteria. The badly nourished cells and tissues in distress for the same reason—insufficient blood supply—are a prey to bacterial invasion. They become impregnated with toxic products, undergo disaggregation and cause destruction of the walls of the arteriolæ and veins, so that if the circulation is not completely interrupted blood collects in the lumen of the strangulated intestinal loop.

I would point out to you an interesting fact, namely, that these

changes arise in the intestinal walls to quite an extent above the site of the strangulation, therefore intestinal hemorrhage into the peritoneal cavity is possible. Also, if the case has reached the phase of fecal vomiting this enterorrhagia may be the source of hæmatemesis if the amount of blood is sufficiently great, a symptom that you must not forget.

In the ultimate phase of strangulation the involved intestinal coil will become gangrenous and well-known symptoms arise which need not be referred to as you are familiar with them all. The complication under consideration never appears in this phase, because it makes itself manifest after reduction of the hernia, the gut being still sufficiently intact to permit of taxis. Let me also call your attention to the fact that in these cases the hernial sac generally contains a certain amount of fluid which, serofibrinous at first, may become sanguinolent, this resulting from vascular exudates due to stasis and serves as a culture medium for innumerable bacteria coming from the intestine, these being the ordinary agents of hernial toxi-infection and destruction of the loop of gut contained in the sac.

From what I have said, you can see how imminent are the accidents from hemorrhage in a strangulated loop of gut and consequently how dangerous is taxis even when conducted with utmost gentleness and care, so that the wise man will not attempt this procedure, but will resort to surgical operation without delay. It goes without saying that in the days when operations were extremely redoubtable and manual reduction was the procedure of choice, intestinal hemorrhages were more frequently met with than now, but still this complication was not a common event even then because most cases of strangulated hernia terminated fatally.

But enterorrhagia does sometimes occur after surgical cure of strangulated hernia when taxis has not been first essayed so that the reason for it must be looked for in: (1) the blood exudate: (2) the hemorrhage may take place in the lumen of the gut either above the strangulation or into the compromised intestinal coil by way of ulcerations resulting from tissue anæmia and bacterial invasion; (3) the hemorrhage may take place when, the coil having been reduced, the pent-up blood in the vessels rushes into the territory of the intestine into which it had been prevented from circulating and by its force breaks down the weakened natural barriers; (4) the possibility of

ulcerations produced by toxi-infection more or less distant from the point of strangulation; (5) thrombosis of the mesenteric veins at the site of strangulation of the mesentery, which by arresting the return circulation may give rise to hemorrhage from congestion arising at once and in considerable quantity; or it may cause gangrene of the intestinal mucosa from blood stasis and a hemorrhage may ensue quite a lapse of time after operative reduction of the hernia; (6) occlusion of the mesenteric arteries followed at the time of reduction of the hernia by sudden dilatation from the high tension of the blood current, will provoke immediate and abundant hemorrhage, as Litten has shown, by tying and untying a ligature on the superior mesenteric artery in animals; (7) thrombosis of these same vessels may also give rise to hemorrhage quite a long time after operative reduction of the hernia, by provoking gangrene of the corresponding area of intestinal mucosa; (8) lastly, occlusion torsion or resection of the omentum are also susceptible of producing thrombosis of the peritoneal vessels.

Such, briefly stated, are the eight principal factors which are to be considered in establishing the pathogenesis of enterorrhagia in strangulated hernia. They are based upon clinical observatory pathology and experimental work. Unquestionable cases of intestinal hemorrhage occurring after operative reduction of strangulated hernia due to embolus of the mesenteric artery in cardiac and arteriosclerotic patients have been recorded, but I think I can give you a clearer general idea of the etiology of this process by dividing the enterorrhagias into two groups, in the first of which should be placed those instances in which the hemorrhage arises shortly after reduction of the hernia. The first etiological factor in this group is contusion of the intestinal walls, the result of taxis, but the loss of blood is not intense and merely consists of the passage of some clots of feces stained black from blood.

Secondly, we have temporary compression of the veins corresponding to the portion of strangulated intestine, or their thrombosis, this being followed by hemorrhagic infarcts of the mesentery and intestine, giving rise to severe loss of blood. It has not been conclusively proved that hemorrhagic infarcts resulting from complete ischemia of the intestine in strangulation can give rise to enterorrhagia.

In the second group of cases are included serious hemorrhage

arising some time after taxis or operative reduction of the hernia, provoked by an expoliation or more or less extensive ulceration of the intestinal mucosa of the strangulated coil. These lesions are due to: (a) gangrene of the mucosa resulting from total ischemia of the intestine in cases of severe strangulation of short duration. (b) From necrosis following venous engorgement in severe strangulation of short duration or in mild strangulation which has lasted for some time. The hemorrhage resulting from this process may be increased by the presence of ulcerations seated *above* the strangulated portion of the gut.

And lastly (c) from rather extensive necrosis of the mucosa arising from venous thrombosis following compression of the veins.

In this group an enterorrhagia should—on account of the nature of the pathologic changes—ensue, but the three etiological factors given have not been conclusively proven to give rise to this complication excepting, perhaps thrombosis. It may very well be that this complication is due to the detachment of the slough formed—after surgical reduction—in the disintegrated subserous tissues their vitality being compromised by blood suffusion and various other lesions involving the strangulated intestinal coil. It is to be remarked that *late* enterorrhagia is a complication of the radical operation for hernia and so far as I am aware, never ensues after taxis. Therefore, very possibly it may be due to lesions of the peritoneal vessels inflicted during operation, which later on cause their thrombosis and gangrene of the intestinal mucosa corresponding to their domain. But when all is said, I fancy that this explanation is problematical.

Perhaps the strangulated area of intestine remains more delicate during the post-operative phase of cicatrization and is exposed to rupture or is easily lacerated if the patient gets up too soon after operation or indulges in a gross diet. In one case the hemorrhage occurred after an alcoholic excess in a constipated arteriosclerotic female subject eleven days after operation, while in a second case, also an arteriosclerotic female, the enterorrhagia developed on the sixth day following an operation for a hernia which was *not* strangulated.

In other cases it was noted at the time of operation that the sulci at the site of the strangulation were deep and ecchymotic, consequently exposed to post-operative necrosis; hence hemorrhage at the

time of elimination of the slough, and an argument in favor of this hypothesis is that enterorrhagia is unknown after taxis when the constriction is not tight and the gut can be easily reduced. In these circumstances the sulci are shallow and not exposed to the various lesions of gangrene.

Severe constriction is also damaging to the vessels, causing inflammatory processes to develop in them which at the time do not react upon the circulation, but later on thrombosis ensues, especially in the veins, with the result that late intestinal hemorrhage ensues.

As you see in the consideration of the pathogenesis of post-operative enterorrhagia in hernia, there are many likely hypotheses, but in a general way, I believe it is safe to assume that several causes simultaneously intervene and it is not always an easy matter to detect the principal factor among them. Autopsies have, however, thrown some light on the subject by revealing the fact that vascular occlusion plays an essential part in some and a capital part in others where the gravity of the hemorrhage resulted in death of the patient.

In twenty-five cases collected by Castaguol, of Bordeaux, seven proved fatal, and of these seven cases three presented phenomena of vascular occlusion. In several of these seven patients arteriosclerosis was manifest.

If, now, the mortality of immediate enterorrhagia be compared with that of the late variety, I find that there were four fatal cases out of a total of eighteen for the former and one out of five cases of the latter. These figures show, contrary to what has been maintained by some, particularly the Germans, that the gravity is not less when the hemorrhage occurs during the first twenty-four hours following the reduction of the hernia and in my opinion it is probably more serious in the long run. However, the statistics to hand are too inconsiderable for one to establish any hard and fast rules, but this much I feel prepared to profess and that is that hemorrhagic accidents from the digestive tract in hernia cases are invariably serious, especially when the loss of blood frequently recurs and is in large amount.

Both in early and late occurring enterorrhagia the cause may be occlusion of the vessels of the mesentery and when this involves the main branches the gravity of the situation is exceptional, because the surgeon cannot treat the condition and must simply await the outcome of events. But if the loss of blood is small, consisting of the

elimination of clots at long intervals, you need not be unduly anxious, because this may occur in most any case of reduced strangulated hernia.

To avoid as far as possible the occurrence of this complication prophylactic treatment after reduction must be carried out. This consists in keeping the patient quiet in bed for two full weeks after the operation on a light diet, particularly liquids and semi-solids in order to diminish as far as possible the mechanical work of the intestine. Care should be given to the functions of the bowels and mild laxatives are to be exhibited in case of need. To my mind, agar-agar, gland extracts and other new-fangled products are practically worthless in such cases and I would advise you to resort to some good old-fashioned prescription, such as one of these:

℞
Magnesii sulphat, 10 grammes.
Aq. menth. pip., 15 c.c.
Aq. dest., aa
Syr. sacchar., 10 c.c.
M. S. To be taken in the morning.

℞
Magnesii sulphat, 25 grammes
Infus. vol. Sennae, 10 grammes in 100 c.c.
Syr. limonis, 25 c.c.
M. S. A dessert spoonful every hour until a stool is obtained.

Or some emollient enema may be given containing glycerine and olive oil, while should there be diarrhœa small repeated doses of elixir paregoric and starch enemata will control the situation.

After the operation the patient will probably run through convalescence smoothly, but should the complication under consideration arise ergotin subcutaneously and ice-bags over the abdomen are about all the therapeutic measures of any avail. Opium should be exhibited to diminish intestinal peristalsis and a strict milk diet must be adhered to until the stools are again normal. The diet may then be increased to milk, soups and eggs for some time.

If the enterorrhagia is profuse and frequently repeated; if the pulse suddenly becomes weak although no blood has been found in the feces, or if syncopal phenomena and a drop in temperature supervene, you must act rapidly regardless of the small chance of success. Injections of ergotin in large doses, physiological salt solution and

calcium chloride are the therapeutic measures upon which you must rely for want of something better. All feeding must be rectal and this is to be continued for some days after all trace of blood has disappeared. These remarks on treatment may seem to you commonplace, but remember that if you are to practice surgery you must be good physicians as well, although a good physician need not be versed in surgery. Success in surgical practice depends much on the surgeon's knowledge of general medicine, therapeutics and pharmacology and neglect of these may not infrequently lead to unfortunate situations in a surgeon's career.

III. HOW TO PUNCTURE JOINTS

You will frequently be called upon to remove fluid or inject diseased joints with various substances for the cure of diseases and I propose to offer some remarks on the topographical anatomy and landmarks for carrying out this procedure successfully. I shall first refer to the hip-joint, but I need not mention the classic points used for the insertion of the needle, such as Calot's anterior point, or Pels-Leusden's anterior point or the antero-superior point as these will be found described at length in most any good modern text-book on operative surgery.

There is, however, yet another access to the hip-joint on the posterior aspect and this is used considerably by Professor Roux, of Lausanne, although it has only been described by Kisseleff (Thesis, Lausanne, 1911) and is consequently not generally known to the profession. By this procedure the injection is made into the posterior cul-de-sac of the joint capsule through the mass of gluteal muscle. If the *most prominent part of the external aspect of the great trochanter be united by a line to the postero-superior iliac spine* and if *this line be divided into five equal parts, the point of union of the two external fifths* (starting from the trochanter) *of this line with the three internal fifths* will mark the limit at which the capsule reflects itself in order to become inserted on the coxal bone by forming the posterior cul-de-sac. At this spot the capsule when thickened from disease can be palpated. In order to make the needle penetrate into this cul-de-sac it should be pushed from behind forwards at a point one or two centimetres to the outer side of this limit (see A, Fig. 1).

This is, I can assure you a most excellent procedure and one that

I unhesitatingly advise you to adopt in your practice. With a little practice you will easily be able to palpate the lump formed by the thickened diseased synovial membrane and you can, without the slightest risk inject the joint. As you experiment on a healthy hip, the capsule being consequently in close contact with the bone, the needle will hit on the osseous surface and will not always penetrate sufficiently deeply into the joint cavity, so that there will be difficulty in forcing the fluid into it, but this will not happen when the diseased joint is distended with fluid.

The knee-joint being the most simple of all on account of its anatomical structure and superficial situation (to the surface of the limb) being little covered by soft structures is therefore the one offering the least number of difficulties in puncture. In point of fact, you can easily penetrate the synovial membrane everywhere excepting over the posterior aspect which is in relation to the large vessels. The patella offers an excellent landmark, absolutely sure and extremely easy to define. If the needle is pushed under the patella it is sure to enter the joint cavity. You can insert it anywhere on the circumference of the patella and in this respect five points can be considered, the first of these being the supero-external point (see A, Fig. 2).

This point is the spot of predilection for puncture or injection into the joint. It is located just above and to the outside of the patella. The needle should be directed obliquely from above downwards and inwardly, following the under surface of the patella. The only structures to pass through are aponeuroses and the fibres of the vastus externus muscle which offer no difficulties. Calot places this point a little further away from the patella from one and one-half or even two centimetres above and outside of the supero-external angle of the patella, inclining the needle about 45°.

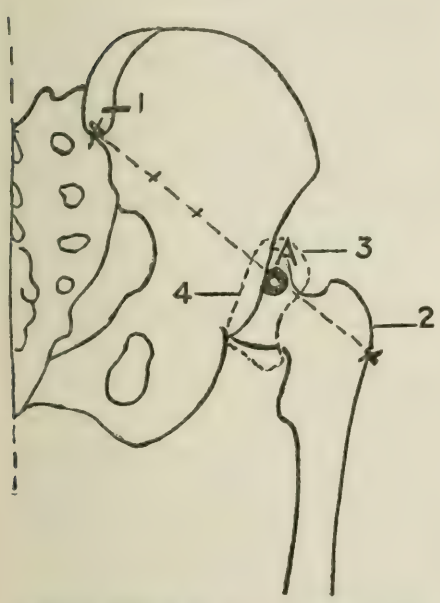
The supero-internal point (see B, Fig. 2) is to be found just above and inwardly to the patella. Direct your needle obliquely from above downwards and outwardly under the patella and the joint is quickly entered. This is an easy procedure, although the thickness of the vastus internus muscle is somewhat greater than the externus and if care be not taken the internal saphenous vein may be injured.

The infero-external point (see C, Fig. 2) is just below and to the outer side of the patella, or what comes to the same thing, just to the

outside of the patellar ligament. Direct the needle obliquely under the patella and push it through the rather thick anterior mass of fat. If your needle is too short the point may get lost in this fat, a point to be remembered.

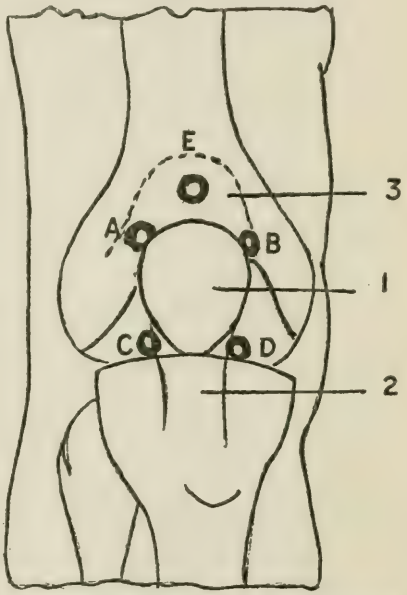
The infero-internal point (see D, Fig. 2) is just below and to the inside of the patella, or in other words, on the inner side of the upper portion of the patella ligament. The same remarks apply to

FIG. 1.



Posterior aspect of the hip. A, Posterior point (Roux's point); XX, line uniting postero-superior iliac (1) spine and most prominent part of the external aspect of great trochanter (2); 3, synovial membrane; 4, its insertion on femur.

FIG. 2.



A, Supero-external point; B, supero-internal point; C, infero-external point; D, infero-internal point; E, upper point. 1, Patella; 2, patellar ligament; 3, synovial prolongation under quadriceps femoris muscle.

this point as to the others. When you make an injection through one of these lower points you must be sure to observe that the point of the needle is neither too deep nor deep enough, so that the liquid will not be injected either into the crucial ligament or the pad of fat. Calot points out that the space to be entered is to be found on a horizontal line passing over the apex of the patella. The apex is very readily felt by the finger and on each side of it a depression can be detected, and a needle passed through either depression will enter the synovial cavity.

The upper point (see E, Fig. 2) is situated above the patella in a space representing the breadth of the transversal diameter of the patella and from one and one-half to about three centimetres above this bone. This space corresponds to the upper cul-de-sac of the synovial membrane and a needle inserted here will invariably enter the joint, especially if you take the precaution to direct it *slightly downwards towards the patella.* You will be guided by the amount of fluid in the joint whose upper limits will vary according to the case, or by palpation of the thickened synovial membrane.

The tibio-tarsal joint can be entered anteriorly or on either side. In front it is only covered by the tendons of the extensor muscles, while on the sides it is only protected by the rather thick lateral ligaments. The absence of any mass of muscle makes palpation of the parts easy. Both malleoli offer excellent landmarks, while the midcourse taken by the anterior tibial artery and nerve eliminates all danger of injuring them. On the other hand, this joint cannot be entered posteriorly.

The points for penetrating into this joint with the needle are the supero-internal, supero-external, internal and external. The first two have been described by Calot particularly, the two latter have been successfully used on the cadaver by Kisseleff.

The supero-internal point (see A, Fig. 3)is located on the inner side of the tibialis anticus muscle at one to one and one-half centimetres above a line uniting the tips of the malleoli and at about one centimetre outside the anterior border of the internal malleolus, otherwise, half way between the latter and the tendon of the tibialis anticus. You will occasionally be able to distinctly feel the anterior border of the articular surface of the tibia.

You should direct the needle backwards and *slightly* upwards. The skin is thin here and after going through the aponeurosis the joint is entered between the tibia and astragalus. Let me warn you to be careful of the artery and external saphenous nerve which are to be found in close proximity.

The supero-external point (see B, Fig. 3) is situated on the anterior aspect of the tibio-tarsal joint *outside* of the extensors. The external malleolus descends somewhat lower than the internal, so that this point should be placed at one and one-half to two centimetres *above* a line uniting the two malleolar apices and at one and one-half

to two centimetres internally to the anterior border of the external malleolus—about the middle between this border and the tendon of the peroneus tertius muscle. Direct the needle backwards and slightly from below upwards. The joint is easily entered and you will also be guided by the crest of the astragalar pulley which is always easy to feel. Injections made in these two points can be done with needles of very small calibre.

The internal point (see C, Fig. 3) is immediately under the tip of the internal malleolus. The needle is pushed in under the malleolus, directing it from *within outwards* and from *below upwards at an angle of from 40° to 45° with axis of the limb.* The needle should go in at least two centimetres, passing through the entire thickness of the strong internal ligament. There is no vessel here. This point may be advantageously placed a little higher and forwards, so that the needle is made to penetrate the joint by grazing the anterior border of the malleolus at three-quarters of one centimetre to one centimetre above the apex. In this case the needle is to be directed backwards from without inwardly—in relation to the axis of the body—and from below upwards.

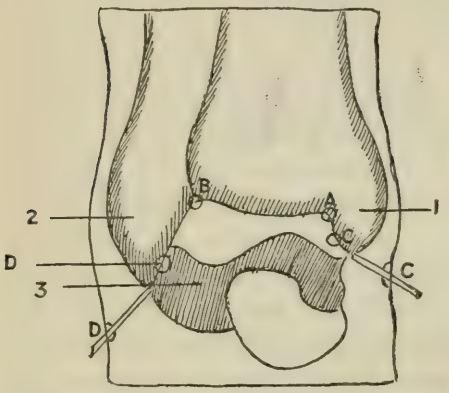
The external point (see D, Fig. 3) is on the external aspect of the ankle, just below the tip of the external malleolus. The needle is made to penetrate under the malleolus, being directed from below upwards—making an angle of about 45° to 50° with the axis of the limb—and inwardly. The external lateral ligament being quite a bit thinner than the internal, the joint is easily entered after the soft parts have been punctured. There is no vessel in the way.

This, like the preceding point, can be made a little higher and more inwardly, in which case the needle should be inserted immediately in front of the anterior border of the external malleolus, three-quarters of a centimetre or one centimetre from its tip, directing it backwards, inwardly and from below upwards. If you use either the external or internal points there is one precaution that you must take, namely: *graze the tip of the malleolus* and do not get away from this bone, otherwise you may injure either vessels or tendons. *On the cutaneous surface* both these points should be marked a few millimetres *below* the tip of the malleolus—not just under it—because the needle should enter obliquely upwards and more obliquely for the external than for the internal malleolus.

The shoulder-joint is rather easily accessible to the needle, because it is only covered by the deltoid muscle and it offers excellent landmarks, such as the acromion, caracoid apophysis and head of the humerus. The external aspect is more usually selected, but the joint can be quite as easily and surely entered through its anterior or posterior aspect.

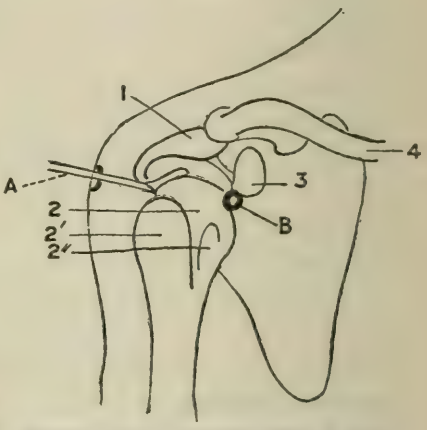
The anterior point (see B, Fig. 4) is located between the caracoid apophysis and head of the humerus, two landmarks easily defined even in subjects with well-developed muscles. The needle is made to enter at the level of the caracoid apophysis or a bit lower, but never more

FIG. 3.



A, Supero-internal point; B, supero-external point; C, internal point; D, external point. 1, External malleolus; 2, internal malleolus; 3, astragalus.

FIG. 4.



A, External point; B, anterior point. 1, Acromion; 2, head of humerus with trochiter (2') and trochin (2''); 3, caracoid apophysis; 4, clavicle.

than one centimetre. The needle is pushed backwards through the external fibres of the deltoid—in thickness about two to three centimetres—to the outer side of the muscles inserted on the caracoid apophysis—short portion of the biceps, coracobrachialis and pectoralis minor. In going through the anterior portion of the capsule the needle readily penetrates between the two bones without injuring any important structures, since the vasculo-nervous mass of the axilla passes lower down, while the bicipital groove is further outward. The arm should be held in internal rotation in order to relax the anterior portion of the capsule.

The external point (see A, Fig. 4) is located on the external aspect of the shoulder-joint, between the acromion and head of the

humerus. The arm being held in slight abduction—about 45°—thus relaxing the upper part of the capsule, the needle is made to penetrate just under the beak of the acromion or one or two centimetres behind it, being directed inwardly slightly from behind forwards and from above downwards. In passing through the stratum formed by the soft structures—principally the deltoid and subdeltoid bursa—the upper portion of the capsule will be easily entered.

The posterior point (see A, Fig. 5) is on the posterior aspect of the joint, as its name indicates. The landmark to go by is a tubercle to be found on the posterior border of the spine of the scapula, at the base of the acromion, formed by a sort of bend that the spine makes at this spot. This tubercle can be easily felt, even in fat subjects. The needle is inserted about two centimetres *below* this tubercle, directly towards and after going through a layer of soft structures two to three centimetres thick the joint will be readily entered. The posterior part of the capsule can be somewhat relaxed by rotating the arm outwardly and bending it a little backwards.

The elbow-joint is very easily reached on all sides excepting its anterior aspect, which is covered by muscles in which pass the main vessels of the region. The numerous projections offered by this joint are all easily palpated.

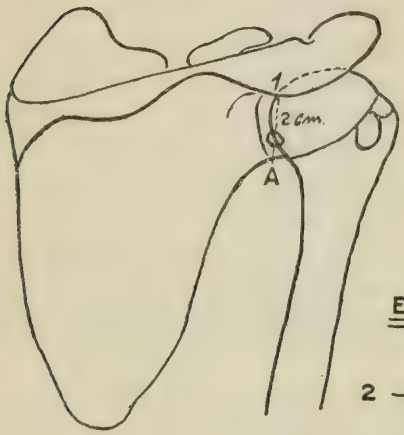
The external point (see A, Fig. 6) is on the external aspect of the joint between the head of the radius and condyle (small head of the humerus). The radial head is easily felt when movements of rotation are given to the hand. To facilitate its location, you need only recall that the articular line at this spot is about one and one-half centimetres below the tip of the epicondyle. The forearm being placed in semiflexion, which position relaxes the lateral ligaments, the needle is pushed in between the head of the radius and the condyle from without inwardly. The synovial membrane is easily penetrated, the radial head being here only covered by the long supinator and the two radial muscles.

The postero-external point (see B, Fig. 6) is just to the outer side of the olecranon, one and one-half to two centimetres below its beak. Push in the needle from behind forwards, grazing the olecranon. Although the posterior part of the capsule is relaxed by complete extension of the forearm, it is preferable to have the limb in semiflexion, as this position disengages the olecranon, as well as the groove

which lies between it and the condyle where the needle should be inserted. This is the best point to puncture the elbow-joint.

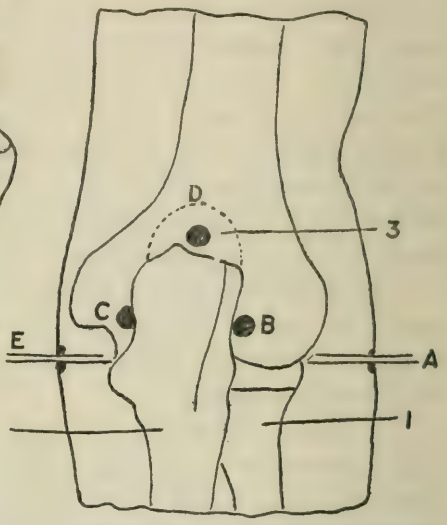
The postero-superior point (see D, Fig. 6). The synovial membrane of the elbow-joint forms a cul-de-sac above the alecronon, which is about two centimetres long when the forearm is in complete extension. In order to penetrate this cul-de-sac you should select an area about two square centimetres in extent, which is found above the beak of the olecranon. The needle should be pushed in from behind

FIG. 5.



Scapulo-humeral point (posterior aspect). A, Posterior point. 1, Tubercle on base of acromion through which the vertical line passes.

FIG. 6.



A, External point; B, postero-external point; C, postero-internal point; D, postero-superior point; E, internal point. 1, Radius; 2, ulna; 3, posterior synovial cul-de-sac.

forwards and slightly from above downwards. The tendinous portion of the brachial triceps muscle is gone through and the joint surely entered. The forearm should be held in extension.

The internal point (see E, Fig. 6) is on the internal aspect of the joint, about one-half to one centimetre below the tip of the epitrochlea. Push in the needle from within outwardly between the ulna and trochlea. Be careful not to insert the needle behind the epitrochlea, but rather a little in front of it in order to avoid injuring the ulna nerve. The forearm should be semiflexed.

There is only the radio-carpal joint that can be regarded as a major articulation in the wrist, but since it very often communicates

with the smaller joint cavities of the carpus and since in pathology it can hardly ever be differentiated from the other carpal joints, I shall consider the carpal and metacarpal joints quite as fully as the wrist-joint, properly speaking.

The communications between all these small joints are most irregular and inconstant, but they may, on the whole, be regarded as three principal synovial membranes quite independent of each other. Consequently, you can determine your points of penetration according to this anatomical arrangement. A needle can only be inserted on the dorsal aspect of the wrist.

It goes without saying that, here as elsewhere, the points that I shall describe are by no means absolute. In practice, you must be guided by the thickness of the synovial membrane and the amount of fluid in the joint cavity. You can select as many points as there are joints in the wrist, but I have selected those points which are the most convenient and which will in themselves be sufficient in the large majority of cases. All these small synovial membranes of the region under consideration can be involved, excepting that of the periform and the joint between trapezins and first metacarpal bone.

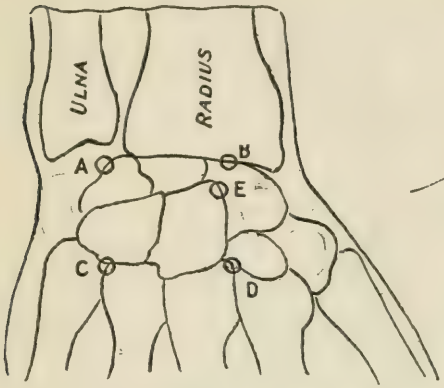
The principal landmark for the radio-carpal joint is represented by the interline of the joint. This is a curved line whose apex is one centimetre below a horizontal line uniting the apices of the two styloid apophyses, according to Tillaux and Testut, six millimetres according to Calot. However, puncture is never made in the middle of the wrist on account of injury to the tendons, but on the sides. Pels-Leusden advises making the punctures on a line uniting the two apophyses.

The ulnar point (see A, Fig. 7) is two to three millimetres above a line uniting the apices of the two styloid apophyses at one and one-half to two centimetres to the inside (in relation to the axis of the limb) of the styloid apophysis of the ulna. The needle is pushed into the joint between the triangular ligament (ulna) and the semilunar bone, passing outside of the tendons of the common extensor and extensor of the little finger.

The radial point (see B, Fig. 7) is on a line uniting the apices of the two styloid apophyses—or a few millimetres below it—at about two centimetres to the inner side of the apex of the styloid apophysis of the radius. The needle is pushed in from behind for-

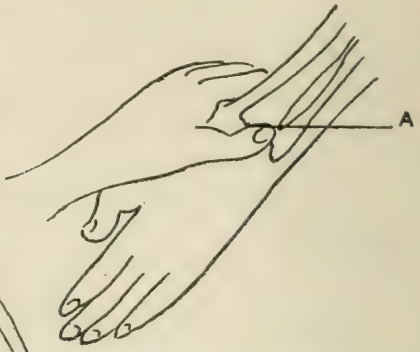
wards, passing between the tendon of the second radial and the extensor of the index, and the joint is entered between the radius and scaphoid bone.

FIG. 7.



A, Supero-internal point; B, supero-external point; C, infero-internal point; D, infero-external point; E, median point.

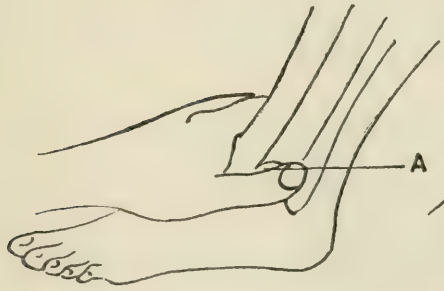
FIG. 8.



A, Edge of radius.

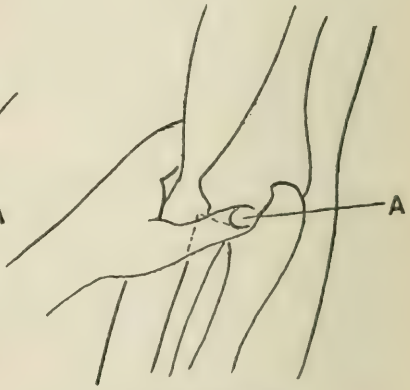
The infero-internal point (see C, Fig. 7) is just above the heads of the fourth and fifth metacarpals. Here you push the needle directly from behind forwards, passing outside of the common extensor

FIG. 9.



A, Astragalar pulley.

FIG. 10.



A, Anconal triangle.

and entering the joint between these two metacarpals and unciform bone.

The infero-external point (see D, Fig. 7) is just above the apo-

physes of the second and third metacarpals. Insert the needle from behind forwards and passing between the two tendons of the radial muscles the joint is entered between these two metacarpals on one side, and the os magnum and trapezoid on the other.

The median point (see E, Fig. 7) is in the midst of the carpus, the needle being inserted one and one-half centimetres above the head of the third metacarpal, passing between the extensor of the index and the common extensor of the fingers and enters the joint between the os magnum and the semilunar.

I have now described about all the anatomic points by which each large joint can be punctured. Of course, in practice, all the data I have given you should be controlled and changed should occasion arise. Such indications will be obtained by a properly carried out palpation, which should be done as follows: You cover the point in which the needle is to be thrust with the end of the left thumb (see Figs. 8, 9, 10), then raise the end of the thumb and push in the needle after you have distinctly felt the osseous ridges which are your landmarks.

IV. SUPERFICIAL DURAL CYSTS FOLLOWING CRANIAL INJURIES

This young man, now twenty-two years of age, fell, at the age of four, from a height of some five or six feet, striking on the head. At the age of eleven he occasionally bit his tongue during sleep and suffered from nocturnal incontinence of urine. About three years later the first convulsive attack occurred suddenly and without any warning and these attacks have continued with intervals of several weeks ever since.

The convulsive seizures offered the usual characters of essential epilepsy, that is to say, the convulsions were generalized.

Examination revealed distinct traces of an old cranial depression, located in the left parietal area, so that a decompressive operation was decided on and was carried out nine months ago.

After removing sufficient bone a large superficial cyst, lying on the dura, was exposed. Its contents were a transparent serous fluid. Since the operation the epileptic phenomena have disappeared and I sincerely hope that the cure may be a permanent one, but I wish to warn you that cranial and brain surgery is fallacious and the ultimate outcome of such cases is, more often than not, discouraging. Some

twenty years ago I operated on a male, forty-two years of age, whose case was almost a counterpart of this young man and the ultimate result was that the patient was worse off than before I interfered surgically. Therefore, your prognosis should invariably be guarded. Neurologists and some surgeons have written a great deal on the subject of brain surgery for the past two decades especially, but when all is said and done, *the surgical treatment of brain lesions has advanced very little as far as really practical results are concerned.*

In cases of superficial dural cysts following cranial injury, the symptoms develop anywhere from several months to a number of years after the initial traumatism. When the cyst has reached its complete development there will be a certain number of symptoms which are rarely absent, and of these headache is the most constant, although it was absent in the case of the patient you have just seen. Of variable intensity, it sometimes amounts only to a limited painful area, usually in the frontal region. In other instances it is generalized, being both frontal and occipital, or it may assume the vertex type common in neurasthenic states.

The pain has little value for making a diagnosis of the *site* of the tumor and in this respect sensitiveness to pressure may be a better guide, although you must not place too much reliance on it.

A change of character is a symptomatic phenomenon to which I would direct your attention. The patient becomes indolent, depressed, and makes no attempt at intellectual effort, but improvement is prompt in some cases after the cyst has been dealt with surgically.

These symptoms are common to most cerebral tumors and therefore have no great bearing on the diagnosis of the type of cysts under consideration, but there is one symptom that is highly important—I refer to hemiplegia—and this is noted in a large number of cases, although they offer clinical types in which the physiognomy of the hemiplegia is somewhat different. In superficial dural cysts the hemiplegia is characterized by loss of voluntary movement resulting from muscular flaccidity, which later on is replaced by contracture. It involves the face and in these circumstances causes asymmetry, especially when the subject attempts to laugh, whistle, etc.

This condition may also involve the upper limb, which hangs inert by the side of the body, and when the lower limb is attacked it is less evident because the patient can usually walk, although he drags the foot.

When contracture supervenes—the result of the degeneration of the motor tracts—the existing extension of the limb changes to flexion. The forearm touches the arm, the hand and fingers flexed. On the contrary, in the lower limb extension predominates, all the segments being forcibly extended while the toes are bent on the palmar aspect of the foot. The tendon reflexes are increased, this being more marked the more the contracture has become accentuated.

The condition of affairs is even worse when the cyst is sufficiently large so that it compresses the cerebral areas controlling sensibility. In these circumstances hemiplegia is complete, but it is not often met with because these cysts are not usually of sufficient size to give rise to so extensive a lesion.

I have outlined certain symptoms which will lead to a diagnosis of cerebral tumor, but there are others whose importance must never be overlooked, and the first of these is essential epilepsy, characterized by more or less frequently recurring convulsive paroxysms, surrounded by certain nervous and psychic disturbances with no fixed character. Epilepsy is not common in superficial dural cysts, but Jacksonian epilepsy is, and the diagnosis of a cerebral tumor and its site can be made from the type of Jacksonian epilepsy offered by the patient, the details of which I need not enter as you are familiar with them.

Among the affections which symptomatically resemble superficial dural cysts, cerebral hemorrhage should first be referred to. In this process there is hemiplegia followed by contracture and increased reflexes. But what is wanting in cysts and which is very evident in most cases of cerebral hemorrhage is apoplexy. Apoplectic ictus—loss of sensation and movement—is made evident by complete resolution. The face is congested, the traits contorted and some slight convulsions may be noted. Then after a variable lapse of time the temperature progressively rises, sensibility returns, all the alarming symptoms retrogress and all that remains is the paralysis which often develops immediately after the apoplectic ictus.

Now, in superficial dural cysts there is no ictus; the paralysis becomes established slowly and progressively, attaining its maximum when the cyst itself has reached its complete development. The diagnosis of cerebral hemorrhage having been eliminated, a brain abscess must next be considered. But traumatic meningo-encephalitis fol-

lows the initial injury some days later, its onset being usually marked by phenomena of excitement. The patient is restless, general or localized convulsions ensue, while disturbances of the sensibility may arise. But in cerebral abscess the temperature is the principal guiding symptom. This reaches 104° F. or higher, the pulse becomes frequent and hard, while death usually occurs in coma. This is far from being the slow, calm progress of superficial dural cysts, so that it is unlikely that an error in diagnosis between these two morbid processes can arise.

The same cannot be said of another affection whose evolution offers much similarity to that of superficial dural cysts. I refer to hydatid cysts of the brain. These manifest their presence by the same indefinite symptoms common to all cerebral tumors and a probable diagnosis may be made if in the patient's antecedents there is a history of his having lived in countries where hydatid cysts are more or less common, but this is the exception and operation is the only sure means of coming to an exact diagnosis of the cerebral process.

Other tumors of the brain—gliomata, sarcomata, etc.—need not detain us, as their diagnosis is impossible as far as their true nature is concerned. Alone, a syphiloma may be suspected if the patient is an old syphilitic, and this is the only cerebral neoplasm that is within our means to diagnose before an operation is undertaken.

Referring now to the pathogenesis of superficial dural cysts I would say that in all cases with which I am familiar, a more or less distant cranial traumatism, with or without fracture, has been noted in the patient's antecedents. Therefore, this etiological notion is important to retain when considering the diagnosis.

But, you will ask, what is the process by which a cranial traumatism will end in the production of cyst? This is a problem that has yet to be solved and upon which opinions differ. Two theories are plausible. One is that the cystic production is derived from a collection of blood, the second that it is the outcome of hemorrhagic pachymeningitis.

If the initial traumatism is at all violent it will give rise to hemorrhage on the surface of the dura, resulting in a more or less extensive blood collection and instances of arterio-venous aneurism have even been recorded. But these collections are not long in becoming transformed into clot which progressively retracts, the fluid por-

tion of the blood being the first to be absorbed by the lymphatics, while the coagulum formed by the fibrin and red blood corpuscles becomes more and more concrete and decreases in size to later disappear.

Now, in superficial dural cysts it is just the inverse that occurs. The fluid portion of the blood is not absorbed; on the contrary, it is found in the shape of a colorless serous liquid, while the clot seems to have completely disappeared from the interior of the cystic pocket. Therefore, some other explanation for the formation of these cysts must be sought for and some pathologists have supposed that this was to be found in hemorrhagic pachymeningitis, and that this focus was the direct remains of the initial lesion, or else the result of inflammatory changes following the traumatic lesion.

The first phase of the process is a connective tissue and vascular neoformation which, starting from the surface of the dura, extends in area and in depth, and in point of fact there is a slightly adherent yellowish product over which are scattered a large number of reddish hemorrhagic spots. When this false membrane is detached it will be seen that it is bound to the dura by blood-vessels. It is formed by migratory cells which rapidly become organized into loose connective tissue, while at the same time a series of transformations result in a metamorphosis of a part of it into blood-vessels. The latter forms a very rich vascular network, whose vessels are all the larger the poorer the connective tissue neoformation surrounding them. In other words, the process is a connective tissue in which the vascular formation is exuberant.

Microscopically, the vessels show dilatations and strictures, the dilatations containing pigment and hemorrhagic débris. These hematic deposits contribute to the thickness of the cyst wall met with in some instances and in these circumstances the clots may be regarded as the residuum of true hæmatomata, in which the liquid part of the blood has become extravasated and forms the cyst itself, while the cruor remains in the vessels and contributes to the formation of the walls of the cyst. This is probably the correct explanation, as it explains the development of both the cyst and its contents.

The evolution of superficial dural cysts necessitates their removal, as no case of spontaneous recovery has been recorded. On the contrary, the convulsive phenomena presented by these patients progressively increase and the condition becomes intolerable. Now, in

practice one of two conditions will be present: first, you may remove a cyst whose symptomatic manifestations are distinct, therefore its location can be readily suspected; or, second, there is a tumor which compresses one of the indifferent areas of the brain and whose site is consequently not clear. In the first case modern cerebral topography will indicate the point where the skull is to be opened and the cyst exposed. In the second case the indications will be more of an exploratory nature and require much sagacity on the part of both the neurologist and surgeon and not a few operative failures must, of necessity, result.

V. INTRAPERITONEAL COLLECTIONS OF BILE WITHOUT APPARENT LESIONS OF THE BILIARY TRACT

I wish to call your attention to an interesting surgical affection to which some attention has recently been paid, namely, the so-called biliary peritonitides—acute or chronic—without any apparent lesion of the bile-ducts or gall bladder. When there is free bile in the peritoneal cavity it produces reactions of the serosa which vary in intensity according to the degree of sepsis of the fluid as well as the defensive power of the peritoneum. In the first place it is certain that all the liquid in the peritoneal cavity is not bile, because the serosa when in contact with the latter reacts by secreting rather abundantly. Usually in the acute forms of the process under consideration, when the bile is thoroughly infected, the peritoneal reaction takes place in the form of the secretion of a small amount of purulent liquid and the development of false membranes. In the subacute types, on the contrary, the fluid is bile-stained serum, but in large amount. For instance, in one case from seven to eight litres of fluid came away after the abdomen was opened.

The fluid in these cases is always free in the peritoneum, but sometimes adhesions are found, although they do not give rise to any distinct pockets and the liquid is not encysted. When the bile enters the peritoneal cavity, it at first collects to the right of the mesentery in the hypochondrium, flank and iliac fossa. Later on, it may invade the entire cavity. However, during laparotomy, an almost complete integrity of the left side has been usually found. All the organic disorders giving rise to symptoms of general peritonitis have developed on the right side only, to such an extent that

in a case reported by Johansson, a fibrinous peritonitis had involved the entire right side, the left presenting no lesion whatsoever.

In the case reported by Clairmont and Haberer, the entire peritoneal serosa was bile-stained, but this was especially marked on the right side. So far as I know, this is the only case in which this condition has been noted, and in my opinion this staining was due to a preceding biliary retention, because it is frequently found in cases of biliary retention.

It was formerly maintained that the bile was both antiseptic and antitoxic. Ehrhardt injected cultures of bacteria into cats whose gall-bladder had been opened and communicated with the peritoneal cavity and he showed that these animals were more resistant than others in which bile had not collected in the abdominal cavity. But at present we know that bile has a nefarious effect on the peritoneal serosa, and experimentally it has been proved that intraperitoneal injections of bile give rise to serious pathologic changes in the rabbit, and that it is a cell poison. By the changes arising in the cells of the peritoneum from the presence of bile the development of bacteria which often enter along with the bile is enhanced. By its presence, bile sets up an inflammatory process which in turn produces destructive phenomena of the endothelium and also decreases the defensive work of the peritoneum by preventing phagocytosis from taking place. Finally, you all know that bile is an excellent culture medium.

In one case of free bile in the peritoneal cavity, the bacillus of typhoid was found. You are aware of the distinctly pyogenic power of this bacterium, and it is an unquestioned fact that it has a nefarious action on the peritoneal serosa. In other instances the bacterium coli has been found, an organism frequently met with in the pus of acute peritonitides. The coils of intestine become more or less distended with gas, according to the degree of intestinal paralysis provoked by the inflammatory process. The serous covering of the gut is often hyperæmic and covered here and there by recent whitish yellow exudate. Intestinal adhesions are not usually present, so that circumscribed areas of localized peritonitis are not met with in these cases, but when adhesions do exist they develop between the gall-bladder, the choledochus and cystic duct. These adhesions, which are occasionally very lax and friable, should be left alone, as the peritoneal process may thus remain limited.

The gall-bladder has always been found slightly distended so that a perforation of this organ can be excluded. Schievelbein states that during operation he could see the bile filter through the surface of the gall-bladder. Palpation revealed the presence of several calculi.

The walls of the gall-bladder are usually thickened, as is the case of long-standing biliary lithiasis, but in none of the cases with which I am familiar were they friable. When the gall-bladder is incised a bile-stained purulent fluid escapes, and what is most interesting to note is that, in Schievelbein's case, the bile in the gall-bladder was very different from that in the peritoneal cavity which had filtered through, In most of the reported cases, calculi were present in the gall-bladder, but in several they were absent.

Histological examination of the gall-bladder has rarely been made, but Johannson found an acute catarrhal cystitis, with hemorrhage in the mucosa and acute inflammatory changes in the subserous tissue and enlarged lymph-nodes. Luscka's ducts, which exist in gall-bladders containing calculi, must be very important in the production of filtration of bile through the walls of the organ, and it is to be regretted that no researches in this direction have so far been carried out.

The biliary ducts, choledochus and cystic duct have appeared to be slightly distended in some cases, while occasionally adhesions have been found binding them to the gall-bladder. In one case there was a black area on the surface of the choledochus which was thought to be gangrenous, but at this spot a large calculus was lodged which was pushed back into the gall-bladder and removed. At autopsy, no ulcerative process in the choledochus could be discovered. This is the only case in which complete occlusion of this duct had occurred.

The mucosa of the ducts has usually been found thickened and their walls infiltrated. In two cases there was a slight induration of the head of the pancreas, but microscopical examination revealed nothing in particular. In one autopsy dilatation of the extrahepatic biliary tract and nodules of secondary cancer in the liver were found, while the head of the pancreas was enlarged, probably from malignant growth.

There are so few known cases of biliary peritonitis that it is difficult to offer a clinical picture of the process, most cases having been operated on in emergency for symptoms of acute general peritonitis.

When a careful history of the case has been obtained, the antecedents have revealed a rather marked lithiasic past. In other instances this cannot be elicited, either because the symptoms were not marked and consequently were overlooked by the patient or because they really did not exist.

The onset is usually sudden, with sharp pain in the right side of the abdomen having the characteristics of appendicitis, so that in most cases a peritonitis from this process has been diagnosed. In one instance, however, the pain appeared to be sharper on the left side. Vomiting usually occurs with the pain. In only one case did icterus occur and was due to a calculus lodged in the choledochus, but was present *before* the peritonitis developed. The stools were clay-colored and the urine dark.

In other cases no mention is made of the feces and analysis of the urine was not made because of the urgent aspects of the case when seen—namely, peritonitis. It would, therefore, seem that icterus does not occur in biliary peritonitis.

In this respect there is a marked difference between biliary peritonitis and peritonitis from rupture of the gall-bladder or ducts, as jaundice is an almost constant symptom of rupture of the gall-bladder. It occurs suddenly at the very onset of the lesion, is very intense and becomes generalized quickly. In cases of biliary peritonitis the bile filters through into the peritoneal cavity and from this fact probably has a different composition from the bile in the gall-bladder.

According to the intensity of the symptoms and rapidity of evolution two clinical forms of biliary peritonitis may be described. The first begins suddenly and the peritoneal phenomena rapidly develop. The abdomen distends and is everywhere painful. Percussion reveals evidences of a large intraperitoneal fluid collection which moves with the position of the patient. In most cases dullness was present in the right flank. Vomiting occurs and occasionally symptoms of occlusion appear.

The temperature ranges between 101° to 101.5° F. and there is a notable dissociation between the pulse and temperature. Bradycardia has been met with, although there was no jaundice and may possibly be accounted for by intraperitoneal absorption of bile.

When the abdomen is opened distinct signs of peritoneal irritation are observed along with the collection of bile, and in these acute

cases the latter is not in large amount. In spite of careful drainage, cholecystotomy or even cholecystectomy, these acute cases end in death.

The subacute form may be properly termed biliary ascites and offers the same symptomatology but considerably attenuated. In one case the temperature reached 104° F., but it is to be noted that the bacillus of typhoid was found in the bile. What differentiates the two forms of the process is the character and amount of the intraperitoneal collection of bile. In the subacute variety it is considerable, as much as six to eight litres. It is not a mixture of thick, viscid bile and a peritoneal exudate, but rather a clear, yellow serous fluid—in other words, a bile-stained ascites.

Abdominal palpation before operation in the subacute cases—although less painful than those in the acute—gives few data, as the examination is made more difficult on account of the large amount of intra-abdominal fluid.

The reason for the difference between the acute and subacute forms of the process is probably due to the fact that in the former the bile is septic and therefore rapidly sets up very serious peritoneal phenomena, while in the latter the bile is not septic, so that when it enters the peritoneum it soon causes the serosa to react, with the natural results that a considerable quantity of serum is secreted. Nevertheless, I would add that in one subacute case the collection contained the bacillus of typhoid.

The prognosis of biliary peritonitis from filtration is unquestionably very serious in the acute forms, but in the subacute varieties it is much better. The earlier the abdomen is opened the better the outlook. Usually the diagnosis of acute peritonitis must be made without attempting to discover the cause, as this usually is out of the question and it can only be ascertained after the abdominal cavity has been carefully explored or at autopsy. If by any chance you should be fortunate enough to suspect the real condition of affairs the patient should be placed in a sitting position, since absorption takes place, especially in the upper part of the peritoneal cavity and above all the diaphragm, while the patient is waiting for operation.

From this viewpoint of treatment, simple drainage is quite insufficient and a choice must be made between cholecystotomy and cholecystectomy according to circumstances. The former procedure with

drainage of the infrahepatic region was successful in one case. It is a more rapid operation than removal of the gall-bladder, which is rendered more difficult on account of adhesions. Its principal indication is when the cholodochus is occluded by a calculus difficult to remove—and time cannot be lost—or compressed by an inoperable neoplasm.

Therefore, cholecystectomy should be done and has usually been successful. Its great advantage is that you do away with the infectious focus, and if a gall-bladder is so diseased that its walls allow bile to filter through it is evident that a cholecystostomy will be ineffectual. It is hardly necessary to add that the cholecystectomy must be followed by drainage of the peritoneal cavity and the patient placed in Fowler's position. The rest of the post-operative treatment is that of peritonitis in general.

VI. ANKYLOSIS OF THE LOWER JAW; ITS SURGICAL TREATMENT

The causes of ankylosis of the lower jaw are several. *Traumatic arthritis* is one, rheumatism another and occasionally a tuberculous arthritis may be the cause. Osteomyelitis was the factor in one case, while typhoid fever, scarlet fever and measles causing an infectious arthritis of the joint, followed by ankylosis are not uncommon. Otitis media is a process which has ankylosis of the lower jaw as a sequel. The extreme thinness of the bony lamella separating the condyle from the external auditry canal explains why an intense otitis media can easily extend to this joint.

Ankylosis of the lower jaw is an affection of adolescence, arising usually between the ages of ten and twenty years. It may be unilateral or bilateral. There is usually thickening and great hardening of the bone, with an almost complete disappearance of the cartilage, the intra-articular meniscus no longer exists—in a word, all trace of the joint has disappeared. There is union between the condyle and the temporal bone, as well as between the coronoid apophysis and malar bone. In cases of fracture either of the condyle or the ascending ramus or other portions in proximity to the joint, the callus may be the active agent of the ankylosis.

An ankylosis has but one positive sign, namely, absolute immobility of the lower jaw in its joint. As secondary symptoms disturbances resulting from this immobility are to be noted, such as those of

the nutrition, respiration, speech and atrophy of the jaw. It is upon these symptoms that you must make your diagnosis, taking into consideration the etiology, progress and duration of the process, etc. As differential diagnostic signs you have the absence of cicatricial bands and the normal condition of the masseter and buccinator muscles. But to be yet surer of your diagnosis narcosis should be resorted to and when the patient is fully under the anæsthetic an attempt should be made to open the jaw.

The prognosis is bad unless operation is resorted to and this must be done as soon as possible. When the ankylosis is due to the formation of cicatricial tissue along the ramus of the jaw osteotomy may be done and a false joint made. This procedure is carried out by several methods, the first of which is linear osteotomy of the neck of the condyle. An incision four centimetres long is made one centimetre below the zygomatic arch, starting at the anterior edge of the auditory canal. This transversal incision avoids injury to the transversal arteries of the face and the branches of the facial nerve which run parallel to the incision. Stenson's duct should always be below the incision and out of the way. A transversal incision is also advantageous, inasmuch as it exposes the neck of the condyle in the same direction as the line of its division.

Next you incise the parotid aponeurosis, exposing a small portion of the gland which should be retracted backwards, and the posterior edge of the masseter which is retracted forwards, and the neck of the condyle will be found a little deeper in the wound. The periosteum is incised longitudinally so that it can be preserved after it has been detached from the bone, as after the osteotomy it will act as a uniting band between the two divided portions of the bone in the pseudarthrosis. The anatomical arrangement of the periosteum at this point makes the decortication very easy. You must be sure to make the incision in the periosteum long enough in order to be able to introduce the periosteal elevator—which must be a very curved one—well behind the bone.

After this has been done a Gigli saw is introduced and the bone divided. Very few vessels are cut in this technic and all that you need remember is the topography of the internal maxillary artery, which is situated directly behind the neck, which it goes round, but this vessel is pushed out of the way when the periosteum is detached as it goes with it.

Cuneiform osteotomy of the neck of the condyle was devised and carried out by Robert Abbe, of New York, in 1880. It was successful in this case. The neck of the condyle is exposed by two incisions, one being vertical three centimetres long, starting from the tubercle of the zygomatic apophysis and carried down to the middle of the parotid. The second incision is horizontal and also the same length—perpendicular to the first—extends from the zygomatic apophysis to the malar bone. The upper attachments of the masseter are detached with care and the muscle retracted downwards along with the parotid and facial nerve. A sufficient exposure of the field of operation can be obtained without involving any important nerve (see Fig. 9). The cuneiform excision of the neck of the condyle might be used to advantage in cases where there is danger of breaking through the thin, bony lamella which forms the fundus of the glenoid cavity. I shall not describe Esmarch's cuneiform excision, as I cannot see how it could possibly be indicated in any case of ankylosis of the lower jaw, and the same applies to Dieffenbach's osteotomy of both the neck of the condyle and coronoid apophysis, although for different reasons.

Excision of the condyle with or without that of the coronoid apophysis may be required to overcome ankylosis of the jaw. Humphry, of Cambridge, England, was the first to excise the condyle (1854). A curved incision is made from the zygomatic apophysis to the ear, passing a little above the tempero-maxillary joint and the orbicular branch of the facial nerve. A second incision is then carried from the first directly upwards over the zygomatic apophysis, avoiding the temporal artery. The bone is divided and the excised bone removed with forceps.

Bottini (1872) exposed the temporo-maxillary joint by a linear incision perpendicular with the joint, made a few millimetres in front of and parallel with the condyle. The incision is made directly down to the bone. The condyle is next cleared of its attachments and the excision made with a chisel and hammer.

Mazzoni made an incision three centimetres long directly over the condyle down to the bone and then attempted excision of the condyle, which could not be done for want of sufficient space.

Bassini employed a slightly curved incision with an antero-inferior convexity, in order to avoid the nerve branches of the region. The incision begins at the external end of the transverse root of the zygo-

matic arch and is carried down to the lower part of the lobule of the ear, then horizontally backwards. The branches of the fifth and seventh cranial pairs are thus supposed to be avoided and the exposure of the operative field is larger. The condyle is then freed from the surrounding structures and excised. The incisions used by Heath, Bull and others need not detain us as they are no more advantageous than those I have described.

I will now briefly describe Koenig's technic for excision of the condyle and coronoid apophysis. The first incision is made along the lower border of the zygomatic arch about three centimetres long; it should be made directly down to the bone and should also divide the periosteum. From the middle of this incision another one is made about two centimetres long perpendicular to the first and only including the integuments. The soft structures are next detached and the anterior aspect of the joint is first exposed by working from above downwards in order to avoid injury to the vessels of the face and parotid gland. The soft parts are then retracted downward. Next the bone is freed with the periosteum elevator all round, but care should be taken to avoid the internal maxillary artery. Should this vessel be injured it should be ligated at the bifurcation of the external carotid.

When this part of the operation has been completed the neck of the condyle is divided, using a Gigli saw. The joint will then be distinctly in evidence, but the saw must be made to exactly follow the lower border of the zygomatic arch and should be directed slightly downwards so as not to involve the glenoid cavity, and go through its vault, which can readily happen if the sawing is made horizontally. When dieresis is complete the excised bone is removed, after which the few bundles of the pterygoid muscle and some adhesions of the capsule are divided.

If excision of the coronoid apophysis is deemed necessary all that need be done is to lengthen the incision along the zygomatic arch about one centimetre, which exposes the apophysis.

Schulten's technic is an incision a little over two centimetres long, commencing at the lower border of the zygomatic arch at the same level as the posterior border of the coronoid apophysis and is carried down and backwards in the direction of the masseter. The fibres of

the muscle are split with a blunt instrument. The apophysis is exposed and then divided without involvement of the buccal mucosa.

Ollier long ago said that exposure of a joint should be carried out just as we do in the case of an artery, by methodically placed incisions, and for this reason I have thought it best to describe the technic employed by different operators in order that you may have some idea of the difficulties of the operation. If division of the neck of the condyle is only to be done a single incision may possibly be enough, although to my mind the field of operation is uncomfortably narrow, on account of the depth in which one is obliged to work. Bassini's curved incision does not avoid injury to the nerve branches of the region. On the whole, I think that Abbe's incision is the best for some cases, but I shall now describe a procedure that you will not find in any of your text-books and which is probably the best yet devised. It is due to Zippel, who described it in his thesis (Paris, 1886) and is carried out as follows (see Fig. 12): An incision (HB) is carried downward in a slightly oblique direction along the posterior border of the maxilla. It begins at the supra-glenoid root of the zygomatic arch and ends four centimetres below, and only includes the skin and fat in order to surely avoid the tempero-facial nerve which crosses it (see Fig. 12).

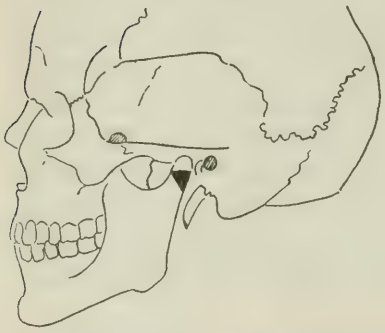
If the coronoid apophysis is to be exposed it is evident that a second incision (AH, Fig. 12) must be made, starting at the upper end of the first incision and carried horizontally for three centimetres along the zygoma. This incision made less long will also be useful if the condyle or infra-condyle portion of the bone is alone to be divided or excised. Therefore, in either case the angular incision forms a small triangular flap (AHB, Fig. 12) which is dissected off and held forwards and downwards.

Next, you must recognize, free and retract the upper lobules of the parotid gland and when this has been done the condyle and neck are accessible, but the base of the latter is crossed by the temporo-facial nerve hidden in the connective tissue. You get the nerve out of the way by scraping the neck of the maxilla with a blunt instrument, and then with a hook-retractor draw the detached structures downwards out of the way. This being done deepen the incision down to the bone, starting at the line of the joint (HM, Fig. 12) and carrying it down fifteen millimetres.

The bone being exposed the periosteum is pealed off. You will be able to go around the bone if you lower the periosteum elevator sufficiently so that the instrument does not lose contact with the bone. Then introduce the Gigli saw and divide the condyle, which is afterwards removed by a bone curette if it is not loose enough to be removed by bone forceps. The operation is completed by arthroplasty with a flap of temporal fascia and fat.

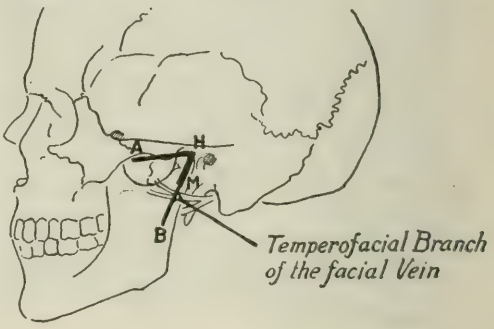
The temporo-maxillary joint can be still more freely exposed by temporary resection of the zygoma, according to Lilianthal's pro-

FIG. 11.



Abbe's operation for ankylosis of lower jaw. Cuneiform osteotomy of the neck of the condyle.

FIG. 12.



HB, Incision from supraglenoid root to zygomatic arch including skin only, about four centimeters long; AH, incision along zygoma directly down to bone, about three centimeters long; AHB, triangular flap to be dissected off and thrown back; HM, deep incision fifteen millimeters.

cedure, and when much space is required it is an operation highly to be commended.

This young man, aged seventeen years, was operated on by the above procedure three weeks ago to-day. The condyle on each side was removed and you see that the result so far has been good, as the patient can now open the mouth without pain or difficulty.

This was a case of bilateral traumatic temporo-axillary ankylosis, due to a fall on the chin when the patient was nine years old. Movements of the jaw began to be somewhat difficult about a year after the receipt of the trauma and this state of affairs progressively increased until there was complete abolition of any movement. The ankylosis had become complete.

VII. POST-TRAUMATIC CONVULSIONS AND TREMOR AND PARALYSIS AGITANS FOLLOWING TRUAMATA TO NERVE TRUNKS

I am now going to touch upon a *medico-surgical* topic, as it interests the surgeon—although powerless to act—as much as the physician, and is of utmost importance in connection with liability insurance.

This man is sixty-one years old, by occupation a gardener. He has always enjoyed good health, is not alcoholic and says he has never had syphilis. The Wassermann is negative, which does not mean anything, as in more than 65 per cent. of old luetic subjects it is not positive. There are no nervous antecedents in his family or personal history.

About four months ago he cut a deep gash in his left forearm, involving some tendons and the ulna nerve. These were sutured a few hours after the accident and the wound healed without any complication. The functions of the hand and forearm are at present restored, and now comes the interesting feature of the case.

Four days after receipt of the injury the left forearm was seized with the characteristic tremor of paralysis agitans and these remained localized to the left upper limb for about eight weeks and then the right arm was in its turn the seat of tremor, although it is less marked than in the left arm. The tremor exists when the patient is quiet or at rest as well as during movement. It ceases when the patient makes an energetic effort and greatly decreases during sleep.

The tremor consists of small, isolated rhythmical vertical contractions of small amplitude and is particularly evident in the left wrist, which is the site of jerky, rhythmical alternating movements of flexion and extension. Tremor of the fingers is little marked excepting the thumb, which quite well presents the movements of spinning. The thumb rests against the index finger, while the other fingers are deviated towards the ulnar aspect of the forearm. This latter condition is in no way the result of the injury and surgical repair of the nerve and tendons.

You will notice that the patient presents a muscular stiffness, immobility of the head and stiffness in walking and propulsion.

Paralysis agitans—like all neuroses—may develop after a violent emotion—which is by far the most common—or following an injury

which is much less common, and I would like to discuss this subject at some length. As I have said, any kind of mental emotion or shock is the factor which causes paralysis agitans to develop in the vast majority of cases. Now, what is the influence of trauma on the evolution paralysis agitans when it at the same time has been the causal agent in the development of this neurosis?

It is difficult to say whether the symptoms are accelerated or not because of the long duration of this neurosis. Generally speaking, however, the process is increased for a few days following the injury —the tremor is more manifest.

Paralysis agitans following traumata is comparatively infrequent in comparison to that developing after mental emotion, but I am unable to give you any figures to show the proportion of cases due to the former factor. This neurosis may arise after various types of nerve injury. Sometimes a mere contusion of a nerve, a prick or complete or incomplete division of a nerve trunk, be it a sensitive or sensitivo-motor nerve, is sufficient for the development of this neurosis. Cases have been known to develop after simple division of the cutaneous filaments, as in incision of the skin. In other words, a traumatism is sufficient and usually it has not been severe. The traumatism acts on a *predisposed soil* and this is the necessary condition for the exclusion of post-traumatic paralysis agitans.

The characteristic symptom of the onset of the neurosis is that peculiar classic tremor of Parkinson's disease. There may, perhaps, be cases in which this neurosis has developed after an injury in a larvate form, that is to say, without tremor, but in all cases with which I am familiar tremor has been particularly mentioned. Therefore, I repeat, a trauma of variable nature occurs and acts upon a soil predisposed by heredity in most cases, but not invariably in all, and once the injury is received the neurosis appears after a variable lapse of time. In the majority of cases, however, the characteristic tremor has appeared very soon after, even within a few hours in a few instances.

In some cases the region of the body the site of the injury has been the site of a peculiar feeling of fatigue for one or several days, or the subject may complain of neuralgic or rheumatic pain in the parts. You know, for that matter, that paralysis agitans of spontaneous origin will occasionally begin with joint pain or that simulat-

ing muscular rheumatism. This pain, which is generally mild and due to the injury itself, may sometimes be very intense with radiations to the adjacent regions.

Tremor is the first symptom at the onset of post-traumatic paralysis agitans. The onset is progressive, while in the spontaneous form of the neurosis, the affection develops all at once, the entire body being seized with characteristic tremor. In the post-traumatic variety the tremor is at first localized to that part of the body which has been the seat of the trauma—it is at first monoplegic—and then little by little, at the end of some weeks, it involves the other limb on the same side and therefore becomes hemiplegic. Then, later on, the tremor develops in the opposite arm. These post-traumatic paralyses agitantes remain hemiplegic for a certain time and only become generalized gradually.

The progressive onset of this affection belongs to the post-traumatic variety, but the tremor does not offer any differences from that of the spontaneous form of paralysis agitans. It exists when the patient is quiet, and like nearly all other types of tremor it ceases during sleep. For some time it is the only appreciable symptom of the neurosis, while in spontaneous paralysis agitans the subjective symptoms develop quite quickly. Therefore, the late appearance of the latter is one of the characteristics of the post-traumatic variety of this neurosis.

It is hardly within my domain to give a full description of this disease; therefore, I shall not describe the subjective phenomena, but I would say that the evolution of the post-traumatic variety offers nothing in particular from that of the spontaneous form. The progress is long and the prognosis far from good, just as in the spontaneous forms.

I would now briefly refer to post-traumatic convulsions and tremors following lesions of the nerves in general. First, there are the muscular disturbances due to irritation—convulsions, contractures, tremor—occurring at the time or shortly after the receipt of a trauma to a nerve. Secondly, there are the muscular disturbances resulting from excitation occurring some little time after the nerve injury, in which case you will be dealing with a secondary neuritis.

In the first class of cases the wound will be in a sensitivo-motor or purely motor nerve or in a strictly sensitive nerve. Among the sensitivo-motor or motor nerves, the median, radial and ulna should

be particularly mentioned. Following a trauma of the trunk or branches of one of these nerves, muscular disturbances arise in those muscles supplied by the injured nerve and these disturbances vary according to the nature of the nerve lesion. If the nerve has been completely divided all influence of the nervous centre ceases to act on the muscle and from this complete interruption paralysis naturally ensues. However, at the time of the receipt of the injury some rapid contractions will be observed very rapidly ending in contracture and soon followed by paralysis, but the preparalytic contracture is of such short duration that it is rarely noted clinically.

In complete division of a sensitivo-motor nerve some convulsions will be observed in the muscles at the time division takes place, soon followed by contracture and then by paralysis. There is pain and anæsthesia in the territory of the divided nerve. The anæsthesia lasts a few hours and sensation soon returns on account of anastomoses between the sensitive nerves.

Now let us suppose that a nerve has been pricked or incompletely divided. Since a certain number of nerve fasciculi have remained intact, paralysis will not be complete and motility will be simply decreased—there is paresis, and for some days after the injury so long as the peripheral end of the nerve has not undergone degeneration some isolated muscular contractions and convulsions will be observed. They occur when the wound is touched or when the muscle is irritated by contact with instruments, etc., and they have no importance clinically.

Only a few nerve fasciculi need be intact in order that voluntary muscular contraction may be preserved and the same phenomena occur here as in compression of the cord. On account of the development of transverse myelitis cases have been met with in which only a very few nerve fibres had remained intact and nevertheless motility was preserved in the lower limbs. The convulsions limited to the muscles supplied by the injured nerve will continue as long as the wound of the nerve has not undergone cicatrization, and these convulsions also arise in cases of incomplete division of a nerve in which the borders of the wound are contused or irritated by a foreign body. Pain is also present along with the paresis and convulsions and these coincide with exacerbation of the pain.

Now, if a purely sensitive nerve trunk is injured on the peripheral end there will be an area of anæsthesia corresponding to that supplied

by the divided nerve, but sensibility becomes reëstablished by recurrent sensibility.

Whether the injured nerve be a sensitive or motor one and no matter what kind of trauma, at the time of the accident and for several hours afterwards, the traumatism of the nerve may provoke disturbances of excitation in the muscles, other than those innervated by the nerve involved if the latter be a motor one. There may be paralysis. Thus, following a wound of a branch of the median nerve, for example, a hemiplegia may develop on the side of the injury or a monoplegia in the opposite limb. Such early paralyses are uncommon and are probably due to inhibition of the spinal centres.

On the other hand, convulsive phenomena are more common than paralytic disturbances. The convulsions do not offer anything characteristic. They commence right after the receipt of the trauma throughout the entire limb, irrespective of the area supplied by the injured nerve. These convulsions may extend to the other limb on the same side or become general. They are intermittent and are provoked by pressure or irritation of the wound, but in some instances they are spontaneous, in which circumstance the division of the nerve is usually *incomplete,* the wound a ragged one or containing a foreign body irritating the nerve. They occur by paroxysms and may end in contracture.

These convulsions are isolated, without any other symptom and belong to the *epileptiform type.* The post-traumatic convulsion occuring in nerve injuries resembles, so far as the phenomenon of convulsion is concerned, true epilepsy, but differs from the latter because in the post-traumatic variety there is no initial cry and other ordinary symptoms observed in the true epileptic seizure.

Post-traumatic epileptiform convulsions, due to a nerve lesion, are simple reflex convulsions and only occur when the wound is irritated during a change of dressing or otherwise.

In some cases these convulsive paroxysms may persist after the wound in the nerve has healed, in which case the phenomenon is due to an ascending neuritis or a neurosis, such as paralysis agitans may ensue. In other words, a neurosis may develop following an injury to a nerve trunk, no matter what may be the nature of the trauma, but such cases are not common in practice. These remarks may seem to you commonplace, but they may be of use to you in your future practice, because you will not find this topic treated in most text-books.

Medicine

TRANSPLANTATION OF THE THYROID AND SO-CALLED INTERSTITIAL TISSUES *

By PROFESSOR SERGE VORONOFF
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I am going to confine my remarks very largely to the thyroid and testicular glands. I shall endeavor to elaborate upon the changes which the cells of the organism undergo as a whole. When one has a clear and definite understanding of the changes that take place in the cells of the organism, he is better able to understand the modifications which these transplants initiate in the histology and physiology of the body cells.

I shall discuss the changes that take place in the muscle cells, in the hepatic cells, and incidentally those changes that take place in other tissue cells.

The different organs of the body are composed of different cells. These different cells have different anatomic characteristics. They are not the same as the primitive cells found in the ectoderm, mesoderm or endoderm. These latter cells become diversified and in departing further and further from the primitive type, they develop certain functions, and become limited functionally to the performance of those functions. The hepatic cell has distinct functions. It elaborates bile, glycogen, etc. The function of the muscle cell is to contract. Each cell is in a sense educated for the function which it is to perform. We may compare the cells to workmen of a highly specialized workshop; each type of cells has its individual function.

Some cells have the power of multiplying ten-fold, a hundred-fold, and a thousand-fold. Others lack this reproductive power. The more highly specialized the cell, the less the reproductive power. The

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cells of the skin have a high power of reproduction. A muscle cell has less power of reproduction. The same is true of the liver cell. A cerebral cell has no power of reproduction. A cerebral cell that is active at the age of twenty years is still active at the age of ninety. It is the same cell. There is no reproduction of cerebral cells. Each cell has been educated for its special function. There are some cells whose initial function is that of reproduction. The leucocytes have a high power of reproduction. They eat and live and reproduce. The leucocyte eats bacteria not because it wants to protect the organism, but because bacteria are foreign bodies, pabulum for the leucocytes.

The phagocytic action that takes place in the presence of bacteria is not due to leucocytes being able to differentiate between bacteria and other foreign bodies or enemies. Leucocytes exert the same phagocytic action on tissue cells whose resisting power is lessened by age, by disease, or other cause.

The connective tissue cells also have a high power of reproduction. They are present in all organs of the body. They form the supporting net work of all organs. They constitute the cement around which are grouped, collected, the essential cells, the parenchymatous cells of organs. So far as known, they have no special function. They are robust and multiply rapidly. I have already stated that the more highly specialized the cell, the more it loses its resisting power to adverse influences. The connective tissue cell has no function. We classify cells into simple cells and cells of specialized function.

Tissue changes take place with advancing age. In autopsies made upon elderly individuals, one invariably observes that the specialized cells have been invaded by the connective-tissue cells. In other words, hyperproduction of connective tissue is present. An abundance of connective-tissue cells is invariably present in senility. Take the muscle cell, in old age we find an abundance of connective-tissue cells and very few muscle cells. In the kidney, age determines an abundance of connective-tissue cells and few kidney cells. With advancing age, specialized cells lose their power of resistance. Diminished resisting power does not occur in connective-tissue cells, because they have no function. However, the connective-tissue cells multiply. They displace and functionally impair the integrity of the essential cells of the various organs.

The same thing occurs in connection with the cerebrum. With advancing age there takes place a vast increase in the number of connective-tissue cells, and a great diminution in the number of cerebral cells. These specialized cells are the cells that have a definite function to perform. The connective-tissue cells multiply and the other cells disappear or are destroyed by the process of age, disease, etc. The brain no longer thinks as well; the kidney no longer secretes as well; the liver no longer secretes bile as well as it did. All this occurs because of the changes incident to advancing age.

The connective-tissue cell has no function. In time it acquires the upper hand in the combat, and we have the substitution of anarchy. The connective-tissue cell respects no tissue, and its predominance means the substitution of a non-thinking cell for one of perfect physiological function. Senility and death come because these connective-tissue cells cannot perform the function of specialized cells, and when the connective-tissue cells have the upper hand we have anarchy substituted for perfect physiological function.

The muscle cell, as I have previously remarked, has the power of contraction; with the substitution of connective-tissue cells for muscle cells, the power of contraction is lost; voluntary motion is lost. Senility and death result from the substitution of connective-tissue cells in place of the specialized cells.

A conflict exists between the specialized cell and the connective-tissue cell. The maintenance of body-health depends upon well-balanced harmony between the specialized cells and the connective-tissue cells.

What shall we do to prolong life? There is a constant conflict between the specialized cell and the connective-tissue cell. Shall we undertake to fortify the specialized cell? Is it indicated to fight the connective-tissue cells? The connective-tissue cell is a part of the body, is not a foreign body, and is not an enemy. Bacteria that invade the body are foreign to the body; they are enemies of the body. They are foreign to the organism. The connective-tissue cells are not foreign to the organism, they are a part of it.

We must respect the normal connective-tissue cell. We must limit the increase of these cells. Under normal conditions the connective-tissue cells will not displace nor replace active normal specialized cells. When a specialized cell ceases to be active, atrophies, suffers

an impairment of integrity, then and only then, is it displaced or replaced by connective-tissue cells. Our aim, therefore, should be to fortify the specialized cell, to see that there is no increase in the number of connective-tissue cells, because by limiting connective-tissue cell increase; by maintaining the integrity of the specialized cells, we prolong life.

Each body organ has a function governed more or less by the endocrine glands. How do these organs perform their function throughout life? For instance, the heart begins beating at birth and keeps on beating so many times per minute for ten, thirty, or sixty years. Why does it do that? The older teachers told us that the beating of the heart was a vital principle. This signifies nothing and was an expression used to conceal our ignorance. It is now known that the beating of the heart is due to the presence in the body of suprarenal glands; upon the removal of the suprarenal glands the heart ceases to beat; the vessels cease to pulsate and death ensues. The parathyroid glands are important endocrine glands. The brain sees and directs, but it cannot do that efficiently unless it receives parathyroid secretion. Upon removal of the parathyroid gland, disorder is substituted to control order. The brain no longer performs properly its function, and the individual invariably dies of post-operative tetany. Each organ has its function to perform, and it performs that function properly only when under the control of one or another of the endocrine glands.

The remainder of my talk this afternoon will consist largely of a discussion on the thyroid and testicular glands and the influence of these glands upon the human organism. If a total thyroidectomy be performed, and if there be an absence of accessory thyroids, post-operative myxœdema invariably supervenes. With congenital absence of the thyroid, there is a condition of myxœdema-cretinism. In individuals with congenital myxœdema or post-operative myxœdema, if operation has been performed early in life, there is always marked impairment of growth.

Cardiac action and vessel pulsation are dependent upon the suprarenal secretion; brain action is dependent upon the parathyroid secretion. There is one organ which influences many organs. With absence or removal of this organ, one observes that the growth of the individual is stunted. A peculiar œdematous condition of the skin

develops. The intellectual faculties of these individuals are markedly impaired. In French they are called cretins, which is synonymous with fool.

Take young animals, remove their thyroid and these same conditions will develop. Upon post-mortem examination, you will find an enormous multiplication of the connective-tissue cells and you will also see that the specialized cells have largely disappeared. These connective-tissue cells want to live; they multiply rapidly. If you want to maintain an individual in good health the multiplication of the connective-tissue cells must be limited. The thyroid gland has one important function—the limitation in number and growth of the connective-tissue cells. It is all important for our health and for the retardation of senility that the growth of the connective-tissue cells should be kept under control. We do that indirectly by maintaining in physiological health the thyroid cell. The thyroid gland is the controlling gland, it limits the multiplication of the connective-tissue cells.

Let us now study the all-important testicular glands. It has been done in two ways: Experimentally on animals and by observations made on eunuchs. Having been physician to the Khedive of Egypt, I had special opportunities of pursuing my researches and of observing eunuchs in the Khedive's harem. They are corpulent and their tissues are flabby. All the functions of their body are lowered in vitality. Their intestinal functions are sluggish. They are constipated. Eunuchs are individuals of inferior intelligence. They are unable to perform work which calls for a continual expenditure of physical force. They are "poor chambermaids," they cannot do much work. After doing a little work they have to sit down, then work a little more, and sit down again. All these eunuchs die young in years though apparently old. For instance, at the age of forty, arcus senilis is often observed among them, and when one hears of eunuchs dying at the age of seventy or eighty years of age, it is more likely to have been forty or fifty. So that in the absence of the testicles, and in the presence of a healthy condition of all the other organs of the body, the eunuch is an inferior individual and this is because of the absence of testicular secretion. His muscles act poorly, and his brain acts sluggishly. In them is well demonstrated the dependence of the various organs of the body upon the testicular secre-

tion. The healthy thyroid gland limits the production of connective tissue cells, thereby hindering the enemy of the body.

The testicular glands have another function, namely, that of stimulating and keeping in health the specialized cells.

In animal experiments I have noticed that upon the removal of either the thyroid or testicular gland, or both, there was a decline in the vital powers. In other experiments instead of removing these glands, they were implanted in animals from which they had been either previously removed or were congenitally absent. The results of these experiments I communicated to the Surgical Congress in Paris in October, 1919.

What has taken place, for instance, in bucks? I have noticed that if the testicles from a buck were removed previous to the development of the horns, the horns would not develop. If the testicles were removed after the horns had developed the horns would become weak and would show no additional growth. We took some bucks without horns, removed their testicles, kept them under observation six months, twelve months, and in the animals whose testicles were removed there was an absence of horns. Then, in those same animals, after testicle implantation we noticed a renewed growth of horns. These castrated animals which were formerly obese and weak became after testicular transplantation sprightly, wiry and vigorous. The glands were implanted in such a way that there was no connection with the vas deferens. The seminal fluid in these cases contained no spermatozoa, nevertheless these animals, previously frigid, behaved, after testicular transplantation, like normal youthful bucks.

We made other experiments. For instance, when a buck gets to be fourteen years of age it is weak; it suffers from incontinence of urine. Upon successful transplantation all symptoms of senility disappeared, and the animal became amorous like younger individuals.

With reference to our experimental work upon the thyroid gland, we were enabled to combat the increase in the number of connective-tissue cells by the transplantation of the sexual glands, so that the individual recovered his vigor and energy. Some individuals are old by virtue of the number of years they have lived, while others are prematurely old owing to disease and excessive work.

Can we be of service to these individuals? Yes. I believe that the general weakening of the individual organism is due to the weakening

of his glands. For instance, in individuals who have been castrated, premature senility is observed. Although young in years those individuals present the appearance of old age. Other individuals, such as those of the diplomatic corps, prominent statesmen, live much longer, due to less impaired integrity of the sexual glands.

In the autopsies made at the Salpétrière on individuals who were easily fatigued, whose brains were sluggish, we observed atrophy of the testicles, fatty degeneration, or absence of testicular tissue; while in individuals of the same age, who were active mentally and physically, post-mortem examination disclosed the sexual glands to be in active normal condition. I believe the sexual glands intensify the life of the cells of the whole body.

We have performed 150 experiments upon the lower animals, but I do not think we are justified in applying this to man. We may implant a gland upon the human subject and have a successful result, but is that sufficient justification for repeating the experiment? No. This work must be established upon a sound foundation. Many, many experiments must be conducted; the technic must be carefully worked out and applied differently, and only after many, many successful experiments in the laboratory on animals, and a perfect mastery of the technic are we justified in carrying out the work on human beings.

In grafting or implanting these organs it is essential that they be taken from individuals of the same species. There is great difficulty in obtaining human testicles, and they would have to be obtained from criminals or from individuals who occasionally are willing to sacrifice their sexual organs, but this is very uncommon.

For our experimental work we have used anthropoid apes. The tailless apes are animals which closely resemble man. It has been found microscopically that their blood is the same as the blood of man and can be used for intravenous injections in man. Intravenous injections of the blood of the sheep or dog into the human are to be condemned. The only species of apes available for this purpose are the chimpanzee, the gorilla and orang-outang. Up to the age of two months one cannot tell the difference between the human embryo and the embryo of the chimpanzee. The chimpanzee and human have the same dentition.

We have had two successful implantations of the chimpanzee thyroid gland upon cretins or myxœdematous patients. One of them was upon a young man who previous to the transplantation of the gland was an idiot. It was not the transplantation of a human thyroid but the transplantation of a thyroid gland taken from the chimpanzee. The experiment on this individual was performed six years ago. To our great surprise, the individual became normal intellectually. He served during the war. I have done this successfully twice.

I cannot give you a definite report on the transplantation of testicles of the chimpanzee upon the human as I have done this only twice on eunuchs, and the cases are still under observation. I do not know what the ultimate result will be, but the attempt opens up a field of wide possibilities. I would caution you not to discard a method which is so promising. The work must be put on a sound, scientific basis. No steps should be taken which will have to be retraced. We should proceed with this work slowly because the method has great possibilities.

I will repeat what I have previously said: The transfusion of the blood of the sheep or dog into the human subject is to be condemned because it is illogical and unscientific, and it has no justification in comparative anatomy.

The transplantation of testicles of the dog or sheep upon the human being should not be undertaken. If it is done it is highly probable that there will be reports of as many failures as attempts.

We have had failures in transplanting organs from one individual to another of the same species, and while we have not had suppuration or necrosis, in some instances, after a time what we have inserted into the tissue disappears. After much experimentation and after changing and improving the technic, I have cases at present under observation in which the transplantation of the sexual glands is very promising in its results, and this improved technic I am going to demonstrate to you this afternoon. I have under observation cases in which sexual glands were transplanted three and a half years ago, and cases in which the thyroid gland was transplanted a period of six years ago. These glands are still present. The operation is attended with little or no danger. It may be repeated. Real progress will have been made when these transplanted glands persist for ten, fifteen or twenty years.

At the conclusion of Professor Voronoff's remarks, Dr. Max Thorek said: An important point to be emphasized is that recently some statements have been published concerning the possibility of transplanting the glands of goats into humans. Such work is the height of ignorance and is inconsistent and illogical from a biologic, histologic, and general point of view. Such experiments have been tried, and invariably in my own experimental work necrosis was inevitable at all times. There was not a single success. There is not a physician, after having attempted this work, who does not admit that such operations were absolute failures. The only successful way is to imitate nature from a biologic point of view.

In this conference I must not neglect to mention that in our own country Dr. G. Frank Lydston has performed this operation, and his work has been described and published in the *Journal of the American Medical Association.* Doctors Stanley and Kalner, of California, have experimented with human glands and have come to the conclusion that it is possible to transplant glands of the same species with admirable primary results, but transplants of testicular grafts from lower animals have met with absolute failure. A deduction can therefore be drawn by every physician as to the justifiability of the process and of its possibilities, and, as Professor Voronoff has pointed out it is only constant research and diligent application that will enable us in the future to test the possibilities of this method.

ARM PAINS, COÖRDINATED OCCUPATION NEUROSES, SENSORY AND SPASMODIC DISABILITIES

HINTS AS TO THEIR CAUSATION, PHENOMENA AND EXPEDITIOUS CURE

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Under the above caption we may group clinically so-called writer's cramp, telegrapher's, or pianist's, or violinist's, or shoemaker's, or tailor's, or seamstress's, or blacksmith's, or dancer's spasm, tennis elbow, along with various paroxysmal distresses, disorders, and some varieties of neuritis. In them tonic spasm and undue fatiguability is a characteristic feature. Combinations of these disabilities are sometimes noted with convulsive tic, alterations of local sensation, pain, tenderness, distress on use and acroparethesia. Sometimes several members of a family are affected.

There appears to me ground for ascribing to all these seemingly heterogeneous disorders common causes or starting points. When the clinical features are located and due attention is given to the primary points of departure, it is my experience that most of these distresses become reduced to a minimum and that they then yield promptly to rational treatment. Treatment methods may, and often must, differ, especially in details. The many numerators can, however, be reduced to certain common denominators, and these it is my purpose to briefly present.

The pathogenic feature usually accredited to each of these is, as in acroparethesia, a deficiency of blood in the supply vessels, a vasomotor cramp or imbalance, which leads to degenerative states in the peripheral nerves. Tone in the arteries is a necessary condition of functional integrity in most structures, especially in the nerves.

Lowered arterial tone is associated (clinically) with depressive states in the cell bodies lying within the interdiscal spaces. These anomalies are also accompanied by disordered states of intra-articular pressure at corresponding cord levels, which probably exert a disturbing influence on innervation by compression upon the lateral

processes. Such disordered states are further indicated by morphogenic as well as sensory disturbances in the paravertebral structures. The chief feature is variation in intra-articular pressures, which must be relieved. Cures can oftentimes be effected by artistic manipulative procedures. To many special points I have urged attention elsewhere in clinical detail.

Is there not a yet more primary or radical common cause lying back of all those which can be determined, either in the domain of trauma, overstress, disorders of body chemistry, ductless gland anomaly, being competent to set these causations in motion? I believe there is, and that this common denominator is of psychopathogenic origin. Why do these sensory, structural and spasmodic disorders arise?

Evidence has come to my attention warranting the opinion (at least it is a postulate worthy of consideration), that the primary cause is strained attention, psychogenic hypertension, emotional misdirection, exerted on a group of structures inducing reflex irritation in the form of tonic protective spasm, in the particular muscle group involved. Of course, there must be a background, a basis of origin and point of departure. The effects deserve remediation, *per se,* also relief of peripheral distress makes for relief of the disorder in the centres.

It is a well-established fact that fear, suspense, anxiety, in some of its diverse modalities, usually acts as a common cause for most depreciations of functions.[1] When this depreciation is protracted and continued long enough, there results such vitiation of fluids, hence of bio-chemical, enzymatic, and other vital processes, as to seriously derange function and later structure. Analysis of many such cases lends color to this assumption. The group under consideration exhibit features which render it peculiarly probable that anxiety, stressful fixation of muscles and associated structures, hence protracted fatigue, along with consequent compensatory shifting of the strain to other structures, induces tonic protective spasm, and thus a sensory stress. This stress is readily exaggerated when the same group is called upon to act many times in the same way when repeated calls are made on it to work. Thus we impinge upon the field of transferred pains or tendernesses.

[1] See article by author, "Nervousness and Its Cause," Medical Council, February, 1920.

In my experience treatment along this line by reassurance, explanation, judicious muscles reëducation, releasing the more overworked, hence spastic muscles, and calling into play other associated structures, has been most gratifying. The crux of relief lies in reëstablishing right or economic voluntary movement, in the disordered muscles through volitional guidance, of muscle reëducation.

The present conception became emphasized by watching the progress of a case of writer's cramp in a young man who was under my care for an entirely different disorder, whom I saw at intervals of a week or two. He was a student in college earning his livelihood by teaching overtime. This compelled him to write for hours at a stretch while under pressure, anxiety, and stress, induced by a combination of causes. It is rare to enjoy such an opportunity to observe earliest stages of progress. The condition is usually seen late, when well developed. It has then become not only complex but obdurate after varied efforts had been made unsuccessfully to compensate. Each futile effort acts as a disappointment and discouragement. Little by little a sense of terror grows lest recovery may be impossible; greater efforts are then made, fatigued structures are subjected to increasing distress and exhaustion. When I examined the arm of this man there were decided tendernesses at critical points in his arm and back, such as will be described later.

The first case of tennis elbow seen by me occurred about twenty years ago. It was of a young man at Bar Harbor who was a crack tennis player, who intended to compete in a tournament in a fortnight, and who suddenly realized he was wholly incapable of doing himself justice. I found that he held his racquet constantly in a strained, vice-like grip, both flexors and extensors being in extreme tension whereby he not only squandered energy but the spasm thus induced utterly prevented accuracy of performance. By explanation and judicious retraining, he was enabled to compete successfully. Emancipation of the fear induced was the most forceful agency in the cure, though a specific training, I demonstrated to him, in the economies of movement were equally essential. Since then I have always searched carefully for the element of anxiety, and am coming to regard the origin as uniformly one of anxiety psychosis in all instances. If this be ratified and supplied it will simplify the treatment, rendering cure more prompt and complete.

In dealing with the problem of arm pains success is obtained in proportion to the exact appreciation, balancing, and correction of the underlying faults, which are both psycho- and somato-genic.

My chief object here is to offer to practitioners measures which each one can readily apply—principles of action by the use of which prompt and permanent cures can be effected. It is indeed true that, from the use of elaborate equipments in electricity, or long specialized systems of treatment at spas or rest cures, excellent results often follow, and radical changes are effected. These, however, are expensive in time and money. They often fail. It is a common experience for me to find such patients gravely discouraged, having run the gamut of many protracted and costly treatments. Several of my cases were of from two, three or many years' duration, and still wholly unrelieved. Some of the worst conditions were cured in a month.

The factors and agents more forceful in relief were found in the outline given above. Long experience in mind searching and moral orthopedia or ortho-kinetics has taught me the efficacy of persuasion and motor-educative measures. Next in importance is a study of the conditions through knowledge gained by estimating abnormalities in local tension and sensitiveness. Facility in using these can be acquired through practice. It is my opinion, often expressed, that physicians have too much neglected a most important field of diagnosis and treatment. This lies in the manipulation of structures, in the education of their own hands so that they shall perceive and appreciate all those factors which the surgeon utilizes, as well as a good many more. The surgeon is content to learn the grosser differences which indicate such diseases and derangements as come within the sphere of his interests. The physician should be able to go much further and become an acute percipient of finer distinctions, of subtler divergencies from the norm. This is an analogous enterprise, the assembling and scrutiny of those more obscure data on which are built the findings in the domain of internal medicine.

Experience won while teaching in a post-graduate medical school for fifteen years (The Philadelphia Polyclinic College), impressed me with the fact that the average well-taught practitioner makes far too little use of his own hands; he exhibits, indeed, marked distaste for personal manipulations. Furthermore, relatively few are equipped

with tactile appreciation of morphologic variants, minor differences in resistance, density, temperature, balance, position, tension, relaxation, rigidity, mobility, adjustability, etc. All these exceedingly significant data, obtainable by means of refined touch, exert a direct bearing on most clinical problems. They are analogous to the exquisite sense perception acquired by the blind, and are within the reach of any one, provided one elects to train his muscular sense and touch perceptibilities.

PRINCIPLES OF ACTION

Psychogenic Hypertension.—The first step in the relief of almost any form or degree of arm pains or of occupation disabilities, should, in my judgment, begin with the release of psychogenic hypertension or emotional misdirection and a thorough educative persuasion. Relaxation is needed of the entire organism, as well as of the parts disordered. Economies in the expenditure of forces should be judiciously taught.

The procedures which serve me best in order to secure complete relaxation may be summed up thus: place the patient in a semi-recumbent attitude and induce mental distraction (the hypnoidal state), then teach conscious direction to different parts in turn, each arm, each leg, the neck, the respiration, the abdominal organs, etc.[2] This is training in conscious purpose and graduated control. Each movement should be made from zero to maximum, from rest to full tension, with special emphasis on the subsequent letting go, a gradual relaxation. This half-waking, or hypnoidal state of Boris Sidis seizes the phases of cleavage between the reasoning mind and the subconscious mind states and is the moment when suggestion is most forceful and when the idea can best be translated into purposive action.

The element of apprehension, suspense, doubt, interferes with judicious effort or restraint. This should be revealed and eliminated in order that progress shall be made.

Releasing Irritation in Subsidiary Nerve Centres by Means of Specially Directed Pressures.—A few outstanding points must suffice. When pain is active in the arms a sympathetic tenderness will be found in the paravertebral tissues adjacent to the vasomotor sub-

[2] See paper by the author, "Poise or Tranquillity a Necessary Condition of Economic Repair," New York Medical Record, May 8, 1920.

centres from which the part is innervated. This irritability is evidenced by not only sensory changes but by alterations in the consistency of structures involved.

If the disability has become chronic, and the only pain is the distressing ache which follows use, there will be found infiltration and thickening of the paravertebral tissues; disturbances in the alignment of the vertebræ (more apparent than real, due to divergencies in nutrition of the structures involved), and these will return to normal morphology and sensitiveness after the application of judicious hand treatment.

When there is hypersensitiveness in the continuity of the nerve, gentle friction along its course will quickly and amply relieve it and also the tonic spasm. If it be exquisitely tender, the procedure should be devised to quiet the centre by (*a*) a gently maintained distributed pressure; and (*b*) by a gently maintained distributed pressure along the course of the nerve; later (*c*) by a stroking friction along the nerve sheath.

Upon each tactile application the sensitiveness will grow less, and after a short interval it should be repeated for three or four times. At last the tenderness will then have subsided by half; on the next occasion this sensory irritation will have returned somewhat, but it will steadily diminish.

A quieting influence is thus exerted upon the irritated vasomotor subcentres and also an improvement of their nutrition by influencing the reflex vasomotor reactions, also the release of intra-articular tension through manipulation of the paravertebral tissues. This is to be achieved by: (*a*) determining by touch the degree of central irritation or exhaustion shown by tenderness, infiltration or alterations in morphogenesis of the structures lying adjacent to those segments of the cord in which the arms, etc., are innervated; (*b*) also by employing the right degree of hand pressure, thereby the nutrition of these subcentres tend to become repaired. (*c*) Relief to the sensory disturbances, tonic spasm, etc., is thus afforded by these same carefully distributed pressures; (*d*) also stroking the lymph-channels and the affected nerve paths, thereby relieving local stasis, freeing the nerve sheaths and other structures from local hyperemia, toxic wastes, etc.; (*e*) stretching the limb by carefully graduated and increasing force along with torsions, first up to the point of pain and no more. This

can be best done by the physician, and when judiciously performed, affords one of the most efficacious means of relieving pain, ache, heaviness, and a restoration of vigor; (*f*) reëducation in coördination, which should be practiced for months or possibly years, by personal effort as well as under supervision, to make sure of complete restoration of poised action.

No matter what measures may be employed to relieve the pain (special electric currents or other), unless this motor reëducation is wisely pursued the radical cure may be compromised.

(*g*) Stroking the lymph-channels and affected nerve paths: Chronologically this is among the first of the indicated procedures. It should be performed centripetally and slowly, gradually increasing the pressure (time, about two minutes). Afterward the tissues should be grasped with thumb and fingers and the entire limb gently squeezed, from extremity to shoulder, to remove local hyperæmia, vitiated lymph and other toxic wastes, etc.

(*h*) Stretching or traction: The one point in the treatment of arm pains on which I am enthusiastic is the application of judicious and graduated stretchings. Stretching of a peripheral nerve exerts reparative effects on nerve centres both subsidiary and primary. Where a limb retains power and elasticity enough to encourage voluntary effort we know that the centres can be thus made to improve. Passive movements also should be habitually employed with more or less effect in proportion to (*a*) the degree of damage to the centre, and (*b*) the degree of skill and persistence of the operator. As to how this should be performed, demonstrations are, of course, better than descriptions.

My methods are these: I cause the patient to relax the muscles completely; seize the wrist by clasping the fingers of both hands, and bring the "heels of my fists" firmly together. This prevents a painful drag on the skin of the patient by the encircling fingers of the operator. Traction is then exerted on the part slowly, to the point of discomfort and no more. Always relax tension gradually, not abruptly, then place the limb in another position and again pull, exert traction; then relax and change repeatedly until the limb is stretched in about a dozen different positions, describing various arcs about six inches apart on the periphery at each pull, and completing the normal circle of arm positions at full length (time, about two minutes). Of

greater nicety is to place one hand of the operator firmly on the shoulder (deltoid, near the insertion), press the humerus down in the socket or rotate it; with the other hand seize the elbow, using the humerus as a lever, and repeat the action in various arcs. During these movements the humerus is moved about in its socket in divers normal positions, further freeing the intra-articular pressure. Finally I seize and pull the arm near the head of the humerus and cause it to describe circles (torsions of large ambit) in two directions, first obverse, then reverse, so that all the tissues immediately thereabouts are put upon the stretch (time, about one and one-half minutes). Next I exert torsions to include the full limits of motion each way, holding the part in tension a few seconds at the end. By this time any painfulness is usually removed. Finally, I lift the arm again, as at first, to its full limit four or five times, almost raising the body weight (time, complete, about five minutes).

The degree of force should be always *gradually* increased until, after two or three weeks (on alternate days), a considerable degree of force can be exerted without marked discomfort.

Reëducation in Coördination.—After each passive treatment it is important to direct the patient to voluntarily extend the arm and fingers with increasing force from zero to maximum; then to hold the tension at the end of the act for three or four seconds; then to relax, extend, again to hold it tense, then to rotate in various directions; again to extend, hold tense, describing all the normal excurses.

This series of active or volitional movements is not only important to insist upon, they should be practiced daily, and later, three times a day for months. Since occupation neuroses are the outcome largely of overuse of the arms in positions of flexion long maintained, this training in the reverse (extension) affords the normal physiologic relief. Furthermore, it is necessary for the motor centres to be stimulated by exciting the extensor reflexes systematically.

Also, since most forms of arm neuritis, especially the protracted and chronic ones, are followed by contractures, and since these are usually in the flexor sphere, it is essential to overcome overflexion by systematic, forceful voluntary extensions in varied directions, carried on persistently for many months. It will prove a relief to the readily recurring arm aches to insist on the practice of these systematic extension exercises when it aches. Note how comforting

it is to stretch out a limb when it has been held in a cramped position.

As to the excellent potentialities of electrical treatment this subject is referred to specialists. It seems that I can secure just as prompt, and usually more complete, relief without electricity. When electricity proves necessary, it should be used.

By the procedures outlined any deft physician can relieve or cure most of the motor and sensory disabilities of the arms which present, without an elaborate equipment in electricity or other expensive devices.

In acromio-bursitis it is desirable first to gently lift the overlying structures by seizing the skin and exerting steady, slow pulls on the overlying dermal structures all about the tender area (subdermal traction). A sense of heat with afflux of blood is thereby induced. This device activates the local circulation so markedly as to cause a rise in local temperature. It becomes the full equivalent of Bier's passive hyperæmia. Pressure on the tender parts is thus released, hence pain, tenderness, stasis, is reduced, the protective spasm and the dysfunction where adhesions about muscles and tendons are released, also the periarthritic tenderness. An admirable method of releasing the obstinate adhesions is to fasten the wrist by a bandage to the headboard of the bed in a loose, comfortable position. While the patient is asleep slight changes in attitude bring about steady, occasional, sharp traction. These being steadily maintained and gradually increased, induce a release of the adhesions less painfully yet radical.

Pædiatrics

EDITED BY JOHN FOOTE, M.D.
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THICK CEREAL IN THE TREATMENT OF PYLORIC STENOSIS *

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It is well known that the majority of cases of pyloric stenosis in infants recover without surgical interference. Heubner,[1] Ibrahim,[2] Sedgwick,[3] and others have reported good results with breast milk or some of the usual milk mixtures. No special advantage is attached to any one of these diets. The author,[4] independently of Birk,[5] started to use thick cereals in the treatment of pyloric stenosis in 1914. Birk, in his book, "Diseases of Infancy," states that he obtained excellent results by giving thickened cornmeal gruel to infants with pyloric stenosis. In my first communication twelve cases were reported. Porter,[6] using this method, was able to cure rapidly ten successive cases. Moll [7] reports good results with "cake-flour-paste."

Much depends on the preparation and administration of the thick cereal. It must be thoroughly cooked and sufficiently thick to adhere to an inverted spoon. One part of cereal to seven parts of fluid (three of milk and four of water) boiled in a covered double boiler for an hour usually makes a cereal of proper consistency. Such a food consists of about fifteen per cent. cereal. Sugar and salt may be added. Most of the cases were started on a cereal as follows, and then the proportions were changed from time to time as occasion demanded:

Skimmed milk	9 ounces
Water	12 ounces
Farina, or rice flour or barley flour	6 tablespoonfuls
Dextri-Maltose	3 tablespoonfuls

Boil an hour or more in a covered double boiler until thick. The consistency of the food requires careful supervision.

* From the Pædiatric Department of the Evanston Hospital.

ADMINISTRATION

A satisfactory way of giving the food is to have the required amount of the prepared food in a cup immersed in a shallow saucepan containing hot water. By taking a little of the warm, thick cereal on the end of a narrow tongue-depressor it can very easily be placed far back into the open mouth and scraped off with another tongue-depressor. Porter recommends the use of a hygeia nipple with an enlarged hole. A great deal of patience is usually required the first few days, as the young infant often keeps the thick cereal in the mouth some time before swallowing it. At first, an hour or more may be required to give a feeding of a few tablespoonfuls, but this difficulty is soon overcome in most cases. Eighteen of my cases were taken care of in the home by the mothers.

Two to six tablespoonfuls of such cereal may be given six to seven times a day. In cases where breast-milk is available one may try giving one or more tablespoonfuls of the cereal before the nursing or bottle breast-milk feedings. If such a regime proves unsuccessful four thick cereal feedings and three breast-milk feedings may be tried for a few days. If this fails to stop the vomiting and loss in weight, then all feedings should consist of the thick cereal. In severe cases the latter procedure should be instituted at once. Any available breast-milk may be added to the cereal replacing the cows' milk. The child should be placed on its right side for a few hours following the feeding. In our last eighteen cases the stomach was not washed out; in fact, very little fluid was given by *mouth* for the first few weeks. Water must be furnished at regular intervals, preferably by retention enema, by the Murphy drop method or by hypodermoclysis.

After thick cereal feedings have been persisted in for some time liquid foods also pass through the pylorus. This interval varies in different cases—it usually requires at least five to eight weeks before an appreciable amount of liquid food can be given without being vomited. The safest way to proceed when this time has apparently arrived is to substitue for one and later for several of the thick cereal feedings ordinary milk mixtures. If vomiting is not provoked in this way the child can be put on a milk mixture without much further trouble. During the past few years rice flour and barley flour have been used in place of or in conjunction with farina.

Thus far thirty-two cases of pyloric stenosis have been treated; of these twenty-four recovered without operation. Seven cases were operated on. Twenty-six of the children are well to-day. The remaining six infants died. One of these, a bad risk, died a few days after treatment was instituted; one developed a broncho-pneumonia about eight weeks after the cessation of vomiting; one (see Case No. 2) died of gonorrheal peritonitis several months after the vomiting had ceased; one, a child of twenty-three pounds, died of influenza a year after the vomiting ceased, and two of those operated on died, both being bad risks. This shows that the mortality of treated cases was extremely low.

TWO ILLUSTRATIVE CASES

The first case is cited to show the rapidity with which recovery may take place in favorable subjects. The rapidity with which the weight increases is one of the most important points in favor of the thick cereal feeding. The recovery takes, as a rule, much less time than with breast-milk or a milk mixture.

Case I.—Harry H., was born in June, 1915. His birth weight was six pounds and twelve ounces. The mother had very little breast-milk after the second week at which time projectile vomiting occurred several times a day. Constipation, peristaltic waves, reduced turgor, and tumor developed in the course of the next fourteen days. Supplemental feedings were instituted at the end of the second week, but the weight decreased until the end of the fourth week. At this time he weighed a little over six pounds. Thick farina was begun—three such feedings alternated with the skimmed milk mixture feedings. The child immediately gained in weight, gaining a pound and twelve ounces in the first month the farina was used. The projectile vomiting had entirely disappeared for a few weeks, although the tumor and peristaltic waves were still present, when projectile vomiting again set in. The diet was rigidly enforced, lavage and great care in handling instituted, and after two weeks the child again gained rapidly. Starch was sometimes present in the stools. He weighed over eleven pounds at five months, and about twenty pounds at one year.

The second case is of special interest. This infant was progressing very well until the gonorrhœal peritonitis set in. The post-mortem

showed the typical hypertrophied, cartilaginous tumor of the pylorus.

Case II.—Rosie F., born October 8, 1917, was seen for the first time January 3rd, 1918; having been admitted to the hospital two weeks before. Her weight on admission was five pounds. She had projectile vomiting, peristaltic waves, stationary weight and constipation. Early in January she was given three thick cereal feedings and four skimmed milk feedings. Retention enemas of six per cent. dextrose Ringer's solution were given twice daily. The vomiting, although somewhat less, continued. After a week she was given seven thick cereal feedings of two and two-thirds ounces each. The formula consisted of: milk, twenty ounces; water, six ounces; farina, three and one-half tablespoonfuls; Dextri-Maltose, two tablespoonfuls. (Boiled one hour.) On this mixture her weight rapidly increased. She gained four ounces the first week, eight ounces the second, eight ounces the third and twelve ounces the fourth, her weight increasing two pounds in four weeks. She was sent home and reported to the out-patient department from time to time. Some months later she was readmitted with a diagnosis of peritonitis. She died the same day and at autopsy the above mentioned diagnosis was made.

DISCUSSION

It is known that on operation of cases of pyloric stenosis the pylorus when relaxed may contract or when contracted may relax. In the one case a tumor forms, as it were, under the hand of the surgeon; in the other the tumor disappears. In some cases the examining physician feels a tumor, although the surgeon fails to reveal it at operation. The futile controversy about the importance of the presence or absence of a tumor has, at times, nearly obscured the all-important question whether and to what degree the pylorus is patent. Whether the passage of food in sufficient quantities is made impossible by a tumor or a spasm is of interest only to the physician. The presence of a palpable tumor as seen in Case II does not necessarily mean that food cannot pass the pylorus in sufficient quantity to satisfy the demands of the growing organism.

Röntgen pictures are of help in deciding this question, and their value has been emphasized particularly by Strauss,[8] who demands surgical interference if the bulk of the stomach contents remains four hours after a feeding. Even if this is adopted for guidance it would

be well to insist that the test meal be composed not of milk mixture but of thick cereal. Or, if stress is to be laid on the presence of hunger stools, these must persist after the administration of the proper test food.

Thick cereal is not a panacea for pyloric stenosis, for there are unquestionably cases which do not respond to this method of treatment. These cases belong to the surgeon. At present we can scarcely improve on the method adopted by Downes,[9] namely that medical treatment is justified for a period of seven to ten days, provided the patient does not lose too much weight (twenty per cent. of the body weight is the maximum loss he allows). In regard to the medical treatment, I wish to suggest that it consist of thick cereal properly prepared and administered. If the thick cereal fails to produce a cessation of symptoms, the Fredet[10]-Rammstedt[11] operation should be done. Very severe cases, or rather cases which have not received careful medical treatment, are nearly as bad a risk for the surgeon as for the internist.

The statement frequently heard that the diagnosis of pyloric stenosis is synonymous with the indication for operation is preposterous, no matter how insignificant the operation may appear to the skilled surgeon. It must be remembered that even an experienced surgeon may have post-operative complications, and one who has little if any experience may have a very great mortality. Furthermore, in a number of cases the vomiting does not stop after operation and has been relieved by thick cereal feeding.

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A CLINICAL STUDY ON ERYSIPELAS OF THE NEWLY BORN

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A SOLUTION of continuity of the integuments is necessary for the occurrence of erysipelas, so that an infant is exposed to this infection from birth as at that time it is exposed to traumatic cutaneous lesions. But to these infections I shall not refer, because under the term of erysipelas of the newly born only that arising from the umbilical wound is included. Therefore, this infection occurs at the time the cord begins to become detached, because up to that time there is no solution of continuity strictly speaking as the divided end still attached to the infant cannot be regarded as a wound. Even in those rare cases where the cord has not been ligated there is total absence of circulation so that no absorption can take place in the stump. But after the third to the fifth day this is no longer the case. As the cord is no longer bathed in the amniotic fluid and since the umbilical arteries and vein are occluded, it withers, dries, shrinks and retracts, becoming a flat, hard and transparent lamella. These changes cause the cord to become a foreign body in its relation to the living structures surrounding its umbilical end, while its elimination will take place. At present, theoretically at least, the elimination of the cord should take place without suppuration or hemorrhage, like a scab, but unfortunately, unless proper aseptic treatment of the stump has not been carried out, things will operate otherwise. When there is any suppuration, no matter how trifling, it means that the umbilical wound is contaminated by bacteria, because there will be no pus unless germs are present. This condition of affairs may go no further, but such is not always the case even at the present day, and erysipelas may develop. It can appear at any time from the commencement of elimination to the time of complete cicatrization of the umbilical wound.

Since puerperal infection and erysipelas are due to the same bacterium, erysipelas in the newly born will often occur when the mother is infected, as the older writers were able to demonstrate. In 1847,

Minor, of Cincinnati, reported an epidemic of puerperal fever, during which almost all the infants died from erysipelas of the umbilicus. Sickles observed the same fact the following year in an epidemic occurring in Missouri, while, in 1856, Leasure and Duchter published striking examples. In one of Duchter's reports there were seven mothers with puerperal fever and all the seven infants died of erysipelas.

Fortunately, the outcome has not always been so disastrous and in another paper Duchter stated that out of ninety-five mothers with puerperal fever only fifteen of the infants developed peri-umbilical erysipelas. Finally, in 1855, Lorain states that in the fearful epidemic of puerperal fever which that year raged at the Paris Maternity Hospital, one hundred and ninety-three women were striken down and fifty infants died of erysipelas.

However, infants may develop and die from erysipelas, although the mother does not offer the slightest evidence of septicæmia and naturally other sources of infection exist. The streptococcus is one of the most omnipresent of the pathogenic bacteria, being found almost everywhere and anywhere, so that contamination of the umbilical cord would be quite likely to occur when there is any neglect in the cleanliness on the part of the nurse, dressings, etc. And in reality, when we reflect how little care is sometimes given to the infant, it is really a wonder that erysipelas does not occur more frequently in them.

Erysipelas of the newly born ordinarily has a very simple, mild onset, without fever or other general disturbances. The process is at first local and circumscribed without reacting on the general health. The extreme mildness of the onset is apt to lead the physician to make a favorable prognosis, especially because this disease is not often met with in infants in these enlightened days. I would here remark that erysipelas is the only disease of the newly born with such a serious prognosis whose onset has such a mild symptomatology. From the start, the evolution of the process is quite different from that in adults. In grown-ups erysipelas starts in with considerable dramatic effect, its onset being accompanied by chills, headache, nausea, vomiting and high temperature, while the exanthema arises at the same time or at least within a few hours later.

On the contrary, in the newly born there is nothing at first in the infant's condition that might even lead to a suspicion of the true

nature of the process. The infant is quiet, sleeps well and takes the breast as usual, nor is vomiting or diarrhœa present, a little swelling and redness at the umbilicus—that is all. However, by the following day, the redness and induration will have extended a little, especially downwards on the abdomen, while a more or less marked œdema will in some cases be found on the vulva in girls, or the penis and scrotum in males. Now, if the attending physician is unsuspecting he will probably attach little importance to these local lesions, especially because there is complete absence of any serious general symptoms.

By the third day, or in the evening of the second, the condition of affairs will have changed. The infant is pale, this palor markedly contrasting with bright red color of the lower portion of the abdomen and soon this redness will invade the groins, upper part of the thighs and buttocks as well as the external genitals, which already offer considerable tumefaction.

The infant then commences to cry and give distinct evidence of suffering; it will still nurse ravenously, but sleep is poor and restless. The rapid progress made by the exanthema is astonishing; the temperature attains 101° to 102.5° F., the pulse is small and rapid—about 150 to 160—while a slight jaundice is visible, especially on the face. In spite of any kind of treatment, the temperature still continues to go up and finally reaches anywhere between 103° to 106° F., where it will remain oscillating slightly although never dropping to any great extent. The erysipelatous plaque will by this time have invaded the legs and feet, which are greatly deformed by the œdema, and finally it extends in an upward direction to the supra-umbilical region, reaching the thorax, neck, shoulders and upper limbs, which in turn become deformed from the œdema.

When the face is involved by the exanthema it offers a characteristic appearance; the lips and eyelids are tumefied, while the cheeks and forehead, which were waxy pale, now present the bright red color of erysipelas infection.

While the exanthema extends upwards to the head and shoulders, the parts primarily involved show a retrogression of the redness and œdema, both of which may, in some cases, disappear completely. In reality, the redness and induration are decidedly more marked on the trunk and face than elsewhere, and at all other parts the erysipelas makes its extension manifest outwardly only by œdema and a more or

less bright pink color of the integuments, with here and there some red areas. At this phase of the process, the erysipelas, which at the onset was confined to the lower abdomen and lower limbs, is especially marked over the supra-umbilical regions of the body and will have almost completely disappeared on the parts primarily involved.

Soon, however, new plaques will appear over those parts that the exanthema had first attacked and had only left some induration. These new plaques, usually isolated from each other, appear and disappear successively, covering the infant's body with large red areas. This is what occurred in the three cases I have observed, but I will not give the histories, as they would merely be a repetition of what I have just described.

However, sometimes the erysipelas does not follow the evolution I have given; the process has not time enough to extend so far, death taking place before the exanthema has invaded the upper part of the body. This is illustrated by the following case:

Male, born on April 3, was admitted to hospital on April 15. At the time there was an abundant suppuration of the umbilical wound, its edges being red, swollen, glistening. On April 16, the redness and induration had extended about one finger's breadth over the skin around the umbilicus; there was less suppuration of the wound. Periumbilical erysipelas was diagnosed and sublimate baths and moist boric-acid dressings ordered.

On April 17 the entire abdomen was invaded by a plaque of erysipelas; the upper part of the thighs and a part of the buttocks and lumbar region were covered with plaques with poorly defined borders. The skin over the thighs and back were greatly thickened and very hard. Enormous swelling of the penis and scrotum. Temperature, 104° F.; pulse, 170. The infant died at 1 A.M. on April 18th.

Autopsy.—Besides the plaques of erysipelas, there was a seropurulent collection in the peritoneal cavity. The liver was large and very congested. All the other viscera appeared normal.

Consequently, it is evident that the erysipelatous plaques cannot be taken as a guide for the prognosis and their study can only serve in making the diagnosis. In the four cases of this process that I have observed, death took place on the second to the fifth day without any apparent complication having arisen, the general symptoms only becoming exaggerated towards the very end. The ultimate phase of the process may be described somewhat as follows:

The face is cadaveric, the skin extremely dry; the temperature reaches 106° to 107° F.; the pulse, very weak, beats at about 170. Anuria is practically absolute. Sometimes there is a fœtid abundant diarrhœa and continual vomiting wears out the infant. At this phase convulsive movements or true convulsions supervene, followed by deep coma and death. Other than the cutaneous lesions, the autopsy reveals no marked pathologic change in the viscera, excepting in the one case where a suppurating peritonitis was found. Death must, therefore, be due to the cutaneous lesions.

The train of symptoms described at the terminal phase of the process are those encountered in all infectious diseases. Therefore, they indicate that death is caused by a hyperacute intoxication resulting from the streptococci present in the skin lesions. This death, which is exceptional in adults, appears, on the contrary, to be the rule in the newly born. This is probably because erysipelas remains localized in adults, while in the infant it invades almost the entire extent of the cutaneous surface. With this we have the very slight organic resistance in infants, so that in them the disease is extremely serious.

Before the modern discoveries relating to infectious diseases, the cause of death in erysipelas was supposed to be due to a *complication*, but these are nothing but ordinary lesions resulting from streptococcus infection, such as phlegmon, multiple abscesses, umbilical phlebitis, peritonitis, etc.

All observers agree that the prognosis of erysipelas in the newly born is fatal, and Trousseau, with his vast experience, stated that he had never seen an infant under the age of one month recover from this infection. Billard and Schmidt, however, state that recovery may take place, and, as in adults, the erysipelatous plaques become effaced, the general symptoms subside and disappear and finally in a few days a furfuraceous dequamation occurs. In other cases the patch of erysipelas disappears and in the regions over which it has travelled multiple abscesses, with rapid evolution, develop. But Henoch points out thus in most cases that abscesses kill the infant, although in a few cases cicatrization takes place and recovery ensues after a long convalescence.

Schmidt and Billard also state that erysipelas may end by a chronic induration of the skin, but I think that, perhaps, a diagnostic

error may have been committed and that these observers mistook sclerema of the newly born for erysipelas. Finally, the fourth and last way of recovery is by gangrene, which leaves severe ulcerating processes when it does not kill the infant.

The duration of the process is always very short; in the four cases under my care the evolution lasted two days in one case and from three to four days in the other three. Billard states that the average duration is from six to ten days, while for Schmidt it is from a few hours to twelve days. Trousseau puts the average time at five to six days, but he mentions a case in which multiple abscesses developed which lasted for twenty-three days.

The diagnosis is easy and could hardly be mistaken for anything other than sclerema and erythema of the newly born. Sclerema does offer some characters common to erysipelas. In both processes the skin is red and shiny and the integuments indurated. But sclerema always begins by the limbs, especially the lower limbs; the umbilical wound remains in perfect condition, likewise the skin of the abdomen remains intact, at least during the early part of the evolution of the affection. Finally, in sclerema, the temperature is very low. These characters are sufficient to prevent an erroneous diagnosis from being made.

The differential diagnosis between erysipelas and erythema likewise presents no difficulty. In the latter process no morbid changes occur in the umbilical wound and the exanthema usually forms small, isolated patches, separated by healthy skin. They are never large plaques in erysipelas, and finally, erythema is met with, especially in those regions moistened by the urine or stools; that is to say, around the arms, over the gluteal region and upper part of the thighs.

Not much has been written on the pathology of erysipelas in the newly born. In the four cases under my care autopsy was done under the most favorable conditions, before any evidence of putrefaction had shown itself and in three identical lesions were found. In the erysipelatous plaques the skin was resistant and hard under the knife; the subcutaneous cellular tissue was thickened and infiltrated by a non-purulent serous œdema. The subcutaneous lymph-nodes appeared to be rather red and a little larger than normal.

No lesion could be discovered in the large blood-vessels. The heart, pericardium, lungs and pleura appeared to be perfectly normal.

The abdominal viscera—intestine, kidneys and suprarenals—were normal, but the liver appeared to be somewhat hypertrophied and the spleen was certainly much larger than normal; it was hard and gorged with blood. In the fourth case there was a sero-purulent peritoneal collection, with soft, fibrino-purulent false membranes covering a part of the intestinal coils, causing them to adhere to the parietal peritoneum. There was no trace of umbilical phlebitis.

In all four autopsies bacteriological examination gave about the same results. Microscopic examination of the serous fluid escaping from the skin and subcutaneous connective tissue after staining with Loeffler's fluid, showed innumerable quantities of streptococci. This was also the case with the fluid from the peritoneum in the fourth case. Cultures from the serous fluid from the erysipelatous plaques made in line on gelose, developed beautiful growths of streptococci.

Microscopical examination of the blood failed to reveal the streptococcus, but cultures on gelose gave growths of the bacterium in all four cases, although few in number. In all four cases the blood was taken from the left ventricle with all due precaution. Therefore, it may be concluded that the pathogenic organism of erysipelas is present in the blood, although in very small numbers, and unquestionably if more microscopical examinations had been made I should have probably found some chains sooner or later.

Pathologic Histology.—I carefully studied the skin, subcutaneous connective tissue, liver, spleen and kidneys, employing a simple and long tried method. Very small bits of skin and various organs were fixed in absolute alcohol and then dehydrated, first in equal parts of alcohol and ether, afterwards in pure ether.

For the study of the cutaneous lesions I employed the ordinary procedures of staining with picro-carmin and hæmatoxylin-eosin. For staining the bacteria in the integuments the sections were first stained with Orth's lithinated picro-carmin and then with Gram's stain. But in the latter stain, instead of gentian violet, I employed Victoria blue in a solution of equal parts of water and alcohol. The Victoria blue appears to me superior to gentian violet, because it does not give rise to the precipitates frequently met with in the latter stain and, on the other hand, it becomes better fixed on the bacteria, while the tissues are easily decolorized.

With a low power (Verick, Obj. 0, Ocular 1) the sections of the

skin and subcutaneous connective tissue reveal innumerable clusters of bacteria strongly stained blue (see Fig. 1, *Frontispiece*). With the same low power a more attentive examination shows that these organisms are especially seated in the subcutaneous connective-tissue stratum; here, in different places they present very numerous colonies almost always developed around the blood-vessels, which they surround like a ring, and finally all these perivascular colonies are united by lines of bacteria following the fasciculi of connective tissue separating the clusters of fat cells. This arrangement distinctly shows that they are seated in the lymphatics and will be seen clearly in Fig. 1, *Frontispiece*.

With this low power it will also be noted that the vascular walls appear to suffer little from the immediate contact of the bacteria. Their contours, well stained by picro-carmin, are very distinct, and the lumen of these vessels do not appear to contain bacteria.

From this low power examination it appears that the bacteria are above all seated in the subcutaneous stratum and that their colonies are all the more abundant as the deeper parts are reached, while, on the contrary, they become more sparse as the dermis is approached. These bacterial masses are larger in the deeper parts of the subcutaneous connective tissue and in some of my preparations only a single colony could be found in the dermis. In a few sections I was able to detect a few small colonies in the deep layer of the dermis.

From this description I conclude that the *localization* of the streptococcus is very different in erysipelas of the newly born from that found in adults. Although in both infants and adults the bacteria are found in the lymphatics of the subcutaneous strata, only in adults are the streptococci seen to infiltrate the dermis, being more numerous there than in the subcutaneous strata. If, with a higher power (Zeiss. Ob. DD. Ocul. 2) the same sections are examined, it will be seen that the lesions of erysipelas in the newly born are also very different from those met with in adults. The following is a brief description of the lesions of erysipelas in adults taken from Cornil and Babes:

"In microscopic sections, it will be seen that the migratory cells infiltrate the fasciculi, especially around the blood-vessels and lymphatic capillaries and in the subcutaneous tissue at the periphery of the fat lobules and lymphatic vessels. The migratory cells are more numerous in the dermis than in the papillæ. The fixed cells are tumefied and may also show a division of their nuclei. To the dia-

Fig. 2.

Erysipelas in the newly born. Section showing streptococci localized in the lymphatics of the subcutaneous stratum.

pedesis and cell multiplication, a sero-fibrinous exudate in the dermis and subcutaneous tissue becomes added. The endothelium of some of the lymphatic spaces is tumefied and some of the subcutaneous lymphatic vessels are filled with migratory cells.

"In preparations of skin in erysipelas, it will be seen that the bacteria form masses in the interfascicular spaces, in the lymphatic vessels and in the subcutaneous fat. It can be seen that in the latter tissue the bacteria occupy the fat cells themselves and are lodged in the protoplasma surrounding the fat droplet."

In the sections of erysipelatous skin that I have examined, the epidermis appeared to be normal, in no way different from that of infants dying from other causes. The dermis also preserved its normal histological characters; its connective tissue fasciculi were not dissociated and the fixed cells of the connective tissue were not increased in number. Nowhere did I observe dissociation and infiltration of the connective tissue with migratory cells. This means that the dermis, like the epidermis, were perfectly normal.

In the subcutaneous layer and although only sections stained with picro-carmin were made, very few lesions could be detected. The connective tissue spaces were somewhat larger than normal and their component fibrillæ were distinctly separated from each other. Besides, it was noted that these interfibrillary spaces were filled with a finely granular substance forming throughout their entire extent a kind of very tightly woven network. Without doubt, this granular substance was coagulated fibrin.

In this subcutaneous layer, no more than in the dermis, was there any leucocytic infiltration. Now, it is known that the phenomena of diapedesis are constant in erysipelas in adults.

If now the same preparation is examined with a high power (see Fig. 2) it will at once be seen distinctly that the masses of bacteria are entirely composed by streptococci and, as with the low power, they are localized in the lymphatics of the subcutaneous stratum. The bacteria are also absent from the lumen of the vessels where a larger number of leucocytes than normal are to be seen. After having examined a large number of slides one or two small chains of streptococci were occasionally seen in the lumen of the blood-vessels. These chains had certainly not been brought into the vessels by the manipulations in carrying out the technic, because in each instance they

were seated in the midst of leucocytes and red blood-corpuscles which almost completely occluded the lumen of the vessel.

Such are, briefly, the cutaneous lesions provoked by erysipelas in the newly born and mentioned, I believe, for the first time in 1891 by Dr. Charles Morel, although little has been written on the subject since.

To sum up, I think that I should once more insist on the two points of difference in these lesions in the newly born and adults. These are: (1) the almost absolute localization of the streptococci in the subcutaneous stratum, and (2) the absence of inflammatory phenomena, since there is never any infiltration of embryonal cells.

We all know since the researches of Metchnikoff that in infectious diseases having a tendency to recovery, diapedesis of the white cells is very marked, and thus wherever bacteria are located the phagocytes reach them in large numbers in order to destroy them. If, on the contrary, the disease has no tendency to recovery, or if the pathogenic agent is endowed with considerable virulence, the phenomena of phagocytosis are not marked and there is little or no diapedesis. In these circumstances the organism seems to let itself become infected, the leucocytes remaining quite inactive as far as the pathogenic bacteria are concerned.

To what is to be attributed this difference between the evolution of erysipelas in the newly born and the adult? Is it because of a lesser resistance in infants to microbic invasion or is it due to a special virulence of the streptococcus? This can probably be answered in the negative. Those observers who have written on erysipelas of the newly born with a periumbilical onset all state that the process is rapidly fatal in the rich and poor alike, as well as in robust or weak infants, and, although I am unable to offer an opinion in this respect, I at least believe that my pathologic studies have shown the differences of the process in infants and adults.

In the various viscera that I examined histologically, an almost complete absence of cell lesions was noted. All that I found in the liver was a very marked dilatation of the intralobular vessels, the hepatic cells being themselves quite intact. The spleen did not offer any morbid changes. In the kidneys the lesions were not at all evident; however, the lumen of the tubuli contorti was somewhat enlarged and the free edges of the cells seemed a little abraded.

Bacteriological examination of all these viscera only revealed very few streptococci, and in only a few preparations did I find a few sparse chains in the lumen of the vessels. However, in the liver of the infant dying from suppurating peritonitis the streptococcus was present in large numbers. Considerable masses of them were seen in the portal divisions and besides, streptococci were seen outside of the vessels in the connective tissue of Kiernans' spaces.

The prophylaxis of periumbilical erysipelas in the newly born is obvious and need not detain us, aseptic treatment of the cord and umbilical wound being the basis.

The treatment of the process when once developed is not satisfactory, but if the diagnosis is made early and treatment started at the very onset of the infection, some infants may be saved. Tepid sublimate baths—one gramme Hg. bichloride to twenty litres of water—should be given, the infant being kept in the solution for at least a half an hour. Three baths should be given in twenty-four hours and gauze soaked in a 4 per cent. boric-acid solution should be applied to the umbilicus during the intervals.

Inunctions of collargol are indicated and after each bath the plaques of erysipelas and umbilicus should be covered with the following ointment:

℞
Ichthyol,
Lanolini.
Aq. dest. $\overline{aa}$ 10 grammes
M. J. ung.

Antistreptococcal sero-therapy may be cautiously essayed, an injection being given once in twelve hours and should recovery take place these are to be continued until all symptoms have disappeared. Intravenous injections of electragol once in twenty-four hours might give results.

Such are the therapeutic measures at our disposal. They give results in adults, but in newly born infants the outcome will probably be disappointing. Nevertheless, the gravity of the disease necessitates severe measures and these should never be omitted simply because the prognosis is almost invariably bad. Some infants may recover when least expected.

CHILDHOOD TUBERCULOUS LYMPHADENITIS; ITS X-RAY FINDINGS AND DIAGNOSTIC SIGNIFICANCE

By MAXIMILIAN JOHN HUBENY, M.D.
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Recent statistics indicate that cardiac lesions are productive of more complications and fatalities than tuberculosis, the latter having had priority over any other disease for many decades.

The reversal is readily comprehended when one considers the coöperative efforts of the medical fraternity, the allied public organs, such as institutions, press and nurses, with the ultimate end products of decreased invalidism and mortality rate.

Direct benefits have accrued because of knowledge as to the causation, both exciting and predisposing, the symptomatology, the pathology and treatment of tuberculosis.

The Röntgen ray has fully established itself as a diagnostic and therapeutic agent. Like all other instruments of medicine, it has its limitations and its usefulness; therefore, considerable judgment must be used in its application. The individual equation, aptitude and experience are potent factors, and it is urged at all times that clinical, pathological and bacterial confirmation should enter into the formulation of an ultimate diagnosis.

Because of limitation of time, mention of some of the diagnostic possibilities will be made. Pulmonary and pleural tuberculosis, with or without glandular involvement of the mediastinal, bronchial, tracheal, and broncho-pulmonary areas, offer the most tangible Röntgen findings.

Bone tuberculosis and tuberculous affections of the alimentary tract, particularly the cecal area, also afford X-ray diagnostic possibilities.

It is, however, with considerable conservative enthusiasm that the Röntgen therapeutic aspect of tuberculous adenitis is mentioned.

In recent years the more general application of the X-ray for tuberculous adenitis has proven its worth beyond peradventure. Because of the ability to establish a more uniform standard, and

appreciating the recognition of such factors, as filtration, intensive radiation, duration of exposure, and repetition, the results obtained have been very gratifying.

When a method produces no mutilation, no tendency towards metastasis, no permanent constitutional derangement, and gives a high percentage of cures, it hardly requires any consideration to accept it as a most desirable procedure.

It is a sad commentary on the medical profession to allow the glands to reach a stage of suppuration, at which point the surgeon is usually consulted, with the consequences that many times metastasis develops in neighboring glands or a constitutional condition occurs. It is expecting too much of surgery. Also, it is a fact, as shown by Bartels and others, that glands may be infected and show no pathological changes, the infection being demonstrable only by animal inoculation.

Since this is true and the objective of operative interference is the timely and complete removal of all foci, it is conceivable that a radical removal by dissection of all diseased glands may, therefore, be considered quite impossible. This is another reason why Röntgen therapy is preferable as irradiation of the entire immediate neighborhood is practised, thereby not only affecting the glands that are manifestly involved, but also favorably influencing those in the entire vicinity.

Sometimes the glands cannot be reached surgically; for instance, adenopathies of the mediastinum, respiratory tract, alimentary tract, and genito-urinary tract, thereby not being amenable to surgical treatment. For such cases the X-ray offers some relief, particularly in tuberculous affections of the tracheal and bronchial lymph-nodes. It is sometimes quite surprising the way dysphagia and dyspnœa are relieved.

The results obtained by Röntgen therapy are so uniformly good that it can be safely recommended as the most useful method.

The lymphatic system is quite vulnerable to the action of the X-ray. The favorable effect of Röntgen therapy in tuberculosis of the lymphatic glands is due in large part to this selective action of the rays upon the lymphoid tissue of the glands, since this tissue is in a state of chronic inflammation and attended by proliferative changes. These cells are destroyed and replaced by fibrous tissue cells. The

lymphatic channels also become converted into fibrous tissue, thus eliminating metastasis to a great extent. This destructive effect upon the lymphatic element, as upon all cells which have a marked tendency towards proliferation, is the most pronounced action observed. This conforms with the well-established observation that the more embryonal the cell formation the more susceptible the cell to X-ray effects. The growth of connective-tissue cells is stimulated and cicatrization follows.

Pirie believes that another important factor is the destruction of the rapidly developing giant cells. Sections of the giant cells often show tubercle bacilli. He believes that these cells become inactive and constitute a place where the bacilli can live unharmed by the leucocytes. By the destruction of these cells the bacilli are deprived of this protection and can then be destroyed by the leucocytes. The question as to whether the Röntgen rays have any direct action on the tubercle bacilli can be answered in the negative. Experiments conducted by Broca and Mahar seem to disprove any such hypothesis.

There are some grounds for believing that irradiation may produce serological changes in the organism so treated.

This may account for the observation occasionally made of the decrease in the size of neighboring or distant, similarly affected, glands, when treatment is directed to tuberculous cervical glands. The systemic effect has also been studied by its effect upon the opsonic index.

It has been shown that the index rises as treatment progresses, but that it will fall into the negative phase and the progress of healing will be retarded if the treatment is too severe. If the dosage is too large, a general reaction may result, evidently due to changes in the blood or to toxæmia resulting from tissue destruction.

Kienbock attributes the destruction of cells to a recession of metabolic activity.

The action of the Röntgen rays in producing healing in tuberculous glands is dependent upon several factors. They bring about actual destruction of the tuberculous granulation tissue, as has been uniformly demonstrated by the microscopic examination of irradiated tubercles. Epithelioid and giant-cells become degenerated, shrunken and finally disintegrated and are replaced by a proliferation of fibroblasts, which are stimulated by the rays.

The rays also cause an amount of reaction in the surrounding tissues, resulting in hyperæmia, and crowding of the vessels surrounding the lesion with leucocytes, which promote absorption of inflammatory products and an infiltration of the tissues with small round cells, which wall off the diseased areas by connective-tissue formation and favor healing.

From the standpoint of Röntgen therapy, we can classify tuberculous adenitis into three groups:

First: Simple tuberculous, non-suppurating lymphoma (inflammatory hyperplasia).

Second: Closed suppurating or partly caseating lymphoma.

Third: Open suppurating and caseating lymphoma with fistula.

In group one are those that occur most frequently, especially in the cervical region of children. The visible, fluctuating nodules about the size of a pigeon or hen's egg decrease in size very appreciably in two or three irradiations.

The greatest decrease occurs usually during the first six or eight days, and occasionally totally disappear in six or seven weeks. Where many neighboring glands are involved and agglutination is present, the progress is not quite so rapid; also some pain is liable to be produced because of congestion, due to marked reaction.

However, in a short time the skin becomes loose and pliable, the glands become discrete, movable and decrease in size, until the nodules are uniformly about as large as a pinhead or pea.

It might be argued that these nodules are active foci; however, Doctor Schneider, of Heidelberg, has demonstrated by examination of microscopic sections that these nodules are composed of epithelioid and spindle cells and isolated Langhan's giant-cells, but no necrotic connective-tissue encapsulation; also that the lymphatic tissue was surrounded with a thickened connective-tissue capsule.

It is a singular fact that recurrences are comparatively infrequent.

The second group can be divided into two sub-groups:

(*a*) Fluctuating lymphoma without inflammatory phenomena.

(*b*) Suppurating lymphoma with more or less inflammatory phenomena.

The first sub-group is the most favorable for Röntgen therapy. They will often yield without any other interference. However, it occasionally happens that spontaneous rupture is liable to occur;

if this is a possibility, a small incision should be made and the pus evacuated or aspiration practised, after which the X-ray treatment should be continued. Healing will proceed rapidly with the least amount of scar tissue.

In the second sub-group it is seldom that resorption of the infective material takes place; however, in these cases a treatment will sometimes hasten the suppurating process, so that an early incision can be made, after which X-ray treatment can again be continued.

The third group reacts quite favorably, although the progress is slow. The fistulous tracts dry up, usually about the third treatment, the granulations disappear, and the tracts close by formation of good smooth scar tissue. Occasionally swabbing the part with iodine will promote more rapid healing.

Old cases with multiple fistulæ and extensive glandular involvement, complicated with ulceration, yield slowly, requiring patience and persistence. Many areas and cross firing should be practised wherever possible. These cases, so distressing in appearance, result many times in remarkable cosmetic effects.

The usual therapeutic application of the X-ray is as follows: *Adults,* 10 Holzknecht units every three or four weeks; 4 mm. filtration, 9½ inch spark gap, 5 milliamperes, cross fire wherever possible. In children 6 Holzknecht will suffice. The dosage should be carefully regulated to prevent toxæmia, dermatitis, telangiectasis or fibrosis of the skin.

When treating the cervical region some care should be exercised to protect the thyroid area, in this way avoiding a possible myxœdema. When treating the pelvic or pubic regions protection should be afforded the ovaries and testes whenever possible, to avoid sterility.

An observation, worthy of mention before closing, is that the response of enlarged glands to treatment may assist in making a tentative diagnosis, for it has been frequently noted that tuberculous glands do not diminish in size very rapidly after exposure to the X-ray, while those of leukæmia or pseudoleukæmia just literally melt away, decreasing rapidly in size, so that very often they will disappear in a few days after exposure.

CHILDHOOD TUBERCULOUS LYMPHADENITIS

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Tuberculous lymphadenitis is an infection of the filter lying between permeable mucous membranes and the blood-stream. Rarely does the intact skin allow such penetration. Abrasions, carelessly handled, or minor operative wounds improperly treated, occasionally act as portal of entry for the organism. The clinical importance of tuberculosis of the lymphatic system has, as its basis, the fact that infection of mucous membranes and the organs underlying them is possible without clinical evidence or physical findings. The regional lymph-node, in its protective activity, shows the first focal signs of the disease.

In childhood this phase of the disease is of relatively greater significance than in adult life; first, because tuberculosis is primary at this age; secondly, because the lymphatic tissue is more active in this period. We have, in childhood, the three essentials for the production of disease, an actively pathogenic organism, a non-immune individual, and an immune producing system, the lymphatic glands. The symptoms then depend upon the massiveness or virulence of the infection, the reactivity of the general protective mechanism of the individual, the functional activity of the diseased glands, and their relationship to contiguous structures.

The constitutional symptoms of tuberculous lymphadenitis will vary from zero to those of an acute hæmatogenous infection. Because in the latter type of case the symptoms of lymphadenitis are so overshadowed by the focal symptoms in more vitally important organs, the lymph-gland assumes a minor place in the clinical pictures. Distinctly regional lymphadenitis of tuberculous origin presents a definite symptomatology. The very fact that the disease is distinctly regional in onset and frequently remains so is important. The first symptoms occur most frequently between the second year and puberty. The lymph-gland reaction against the invading organism is a violent and persistent one, resulting in a subacute or chronic disease. Chil-

dren with this type of infection form the group normally or nearly normally tall, but distinctly under weight. Fatigue from moderate exertion is common, as contrasted with the usual exuberancy of early childhood. The pulse is frequently accelerated. A slight afternoon rise of temperature is usual. The appetite is finicky and distinctly decreased. It is quite common to see a fat dislike in this group. A state of poor health, without definite findings, insidious in its onset, slow in its course, best describes the condition that causes one to look for regional evidence of tuberculous adenitis. This syndrone evidences a mild but persistent toxæmia, varying in degree of intensity but persisting over a period of months or years. It is accompanied by a moderate reduction in hæmoglobin and red cells.

The diagnosis is dependent upon a positive tuberculin reaction, history and regional findings. The tuberculin reaction is purposely given first place. It is simple, harmless and conclusive. The von Pirquet test, using human and bovine tuberculin with a control in the centre, is the one I commonly use. Occasionally I use the intracutaneous test. It requires more time, and in a nervous child produces unnecessary alarm. With tuberculous infection anywhere in the body, the reaction will be positive, unless the case is a fulminating one or the child dying. It may be temporarily absent during the acute exanthemata, especially measles and scarlet fever. It is rarely present with pertussis, and often disappears during a pneumonia. During convalescence it again appears.

The anterior surface of the forearm is most convenient for either test, but the neighborhood of suspicious glands often gives more vicious reactions. This has been uniformly true in my experience with cervical adenitis. I have not tried it elsewhere.

A history of tuberculosis in another member of the family, or an intimate though short association with other tuberculous individuals, is distinctly of service in diagnosis. The history of use during infancy of unsterilized, non-certified milk, especially milk from but one cow, not infrequently is encountered in children from small communities.

There are certain peculiarities of the children in whom one finds tuberculous adenitis. Waldeyer's ring so frequently shows evidence of hypertrophy that tonsillectomy and removal of adenoids is usually indicated. In addition, there is a generalized hyperplasia of lymph-

atic gland tissue aptly described as micropolyadenopathy. Carious deciduous teeth occur unusually frequently in these children.

Locally the bronchial and hilus gland type of infection is of greatest frequency, and deserves special consideration in diagnosis. The general symptoms described above prevail.

Children with disease of these glands may frequently be classified in one of the three following types: The " Traviata " type, tall, aristocratic-looking youngsters, quiet-mannered, oval faces, long dark eyelashes, sound white teeth, slender limbs, long narrow chests and abdomens. They look comparatively well when dressed, but strip them and one sees immediately the absence of fat, and the winged scapulæ.

Another type fairly common is the " asthmatic." In this group the children are usually short, the chests barrel-shaped, and the appearance gnome-like. The emphysema is so great that physical findings of infiltrated glands cannot be demonstrated.

The third type is " thymic," the " pastose " child. Infantile fat and the rounded body form persists into adolescence. An afternoon rise of temperature is usual. Slight exertion brings on great fatigue. Tuberculin tests are as actively positive as in scrofulous children.

The usual hilus tuberculosis does not produce anything so typical, although long eyelashes, unusually good hair and excessive lanugo over the extensor surfaces and back occur with sufficient frequency to deserve mention. Diagnosis is made from family history and general symptoms, to which are added the findings due to the location of the enlarged glands, some or all of which may be present in a given case. A dry, harsh, persistent, spasmodic, non-productive cough, enlarged superficial veins over the anterior surface of the chest, dulness in the intra-scapular area extending two or three finger-breadths below the level of the scapular spine, dulness of the fourth, fifth and even sixth thoracic spines on direct percussion when the glands at the bifurcation of the trachea are enlarged, and very frequently slight tenderness of the spine of the corresponding vertebra are usual. A positive d'Espine is heard usually over the dull spine. Breath sounds are very often harsh, especially over the bases posteriorly. If the hilus group of glands is much involved, the intra-scapular field, especially on the right side, will be found to show a bronchial type of respiration. The X-ray findings are of value. A good stereoscopic picture will outline the hilus. I have not felt the fluoroscope to be of much value,

but this may be accounted for, in part, by the fact that one will not spend the necessary fifteen minutes in a black room before attempting to use the screen.

The lymph-nodes of the neck are more frequently involved by tuberculosis than are superficial glands elsewhere in the body. This is natural, as their source of infection is the upper respiratory as well as the upper digestive tract. Both bovine and human infection is possible. Endogenous, exogenous, and hæmatogenous infections undoubtedly occur. The first symptom is usually that of a swelling in the neck, firm and painless. It most frequently occurs in the group of glands lying in the submaxillary space or in the superior deep cervical chain, close to the carotid and internal jugular. Occasionally the onset is as stormy as an acute suppurative adenitis, but usually there are weeks when the gland seems stationary in size; then overnight there is an apparent enlargement. This cycle may continue for months. The exacerbation often occurs during an upper respiratory tract infection. At first one gland is involved, but gradually the disease progresses until a number of centripetal glands in the chain are involved. The first one to be diseased remains the most noticeable for a long period, but occasionally one in the centre of the chain lights up actively and overshadows it in prominence. At the onset the glands are discrete, almond shape in size, firm and smooth. As the process advances, however, the periglandular structures and connecting lymphatics become continuously involved in a palpable, knotty chain, in which it is difficult to differentiate individual nodes. At any stage in this chronic condition the disease may recede or individual glands caseate, becoming fixed to contiguous structures. As involvement approaches the skin a peculiar, localized, cyanotic erythema is produced. This erythema is quite typical of tuberculous reactions in the skin. It is the same in the scrofulous von Pirquet, in scrofuloderma and in the erythema induratum of Bazin.

When this evident victory of the infection over gland tissue occurs, a softness of the centre of the mass can often be noted. If allowed to proceed, it will eventually discharge a thick curdy pus. This will continue intermittently, sometimes largely serous in character, until the entire gland has disappeared.

The constitutional symptoms accompanying cervical adenitis may be negligible or prominent. They are usually those of a mild toxæmia,

but with the intercurrent infections, such as measles and whooping-cough, reactions may become violent and result fatally.

In tuberculous lymphadenitis of the neck, as in the mediastinal gland disease, a type of child may readily be described, the scrofulous. My conception of this youngster is that the type is not definitely the result of tuberculosis. It seems much more likely an infection with tuberculosis grafted upon the exudative diathesis of Czerny. Every opportunity is afforded by the low skin resistance of the facial eczema for infection. The lowered resistance of the glands from constantly diseased lymph and the unhealthy condition of the mucous membranes of the nose and eyes make the engrafting of tuberculosis but a matter of opportunity. In these cases the short upper lip, the swollen face, as well as the poor physical condition of the child, aid in diagnosis. The cervical glands are always very large and numerous, and the tendency to break down is greater than in ordinary cases.

Tuberculosis of the mesenteric glands is found not infrequently post-mortem. When extensive, and then only, a diagnosis can be made during life. Under these circumstances symptoms relating to the gastro-intestinal tract assume prominence; anorexia, periods of intestinal indigestion, and, if ulceration of an adherent gland occurs, occasional attacks of diarrhœa. In the cases in which involvement is marked, the gland masses can be palpated as a tabes mesentericus. When secondary to a tuberculous appendix or cæcum, the symptoms of the primary disease predominate.

Axillary lymphadenitis differs in no way from that of the cervical glands except in lesser frequency and in point of infection. Tuberculosis of a rib, of the mammary gland, and occasionally of cervical glands precedes it. Rarely it is secondary to tuberculosis verrucosa cutis.

Inguinal gland tuberculosis is rare. Here also it may be secondary to a tuberculous verrucosa cutis. Occasionally it occurs as a result of a directly infected circumcision. The diagnosis is made by long observation, although occasionally tuberculosis miliaris cutis of the penis aids. Tuberculosis in other gland groups, as the popliteal and cubital, is so rare in childhood that it need not be discussed. Generalized tuberculous adenitis is also rare, except in the presence of so active an infection that focal symptoms elsewhere cloud the picture.

As an aid in diagnosis, the skin lesions are invaluable, but unfor-

tunately infrequent at the time when most needed. Scrofuloderma around old, discharging sinuses or over glands about to break down is usual. Lichen scrofulosorum is rare, but characteristic when found. The lesion is a discrete, millet-seed-size papule, arranged in patches, itches slightly and has a light scale. It is often accompanied by a lichen pilaris, the horny spine projecting slightly from the follicles.

Papulo-necrotic tuberculids are more common. They occur on the backs of the hands, on the forearms and around the ankles most frequently. They are larger than the lichen lesions and have a dark adherent crust. When it is removed, it leaves beneath a necrotic centre.

Tuberculosis miliaris cutis occurs as a late finding, except with infected circumcision. The lesion is at first a yellowish-red nodule going on to shallow ulceration with new crops occurring at its edge.

Erythema induratum of Bazin is characterized by its deep origin, gradual approach to the surface, usual location on the lower extremities and, when near the skin, violaceous color. It breaks down as a rule and discharges a small amount of serous fluid.

Phlyctenular keratitis is equally characteristic, and, when present, has positive diagnostic significance.

Differential Diagnosis.—Tuberculous lymphadenitis needs differentiation from all diseases which may be accompanied by an adenopathy. From acute general infections, the course and intercurrent symptoms speedily clear up the diagnosis. The late adenopathy of syphilis can be differentiated by the history, the fact that the glands are usually small and remain so except in the presence of a gumma, the positive Wassermann, and spirochetæ obtained by needle puncture.

From Hodgkin's disease, the differentiation is at times impossible except by the pathologist. The blood picture in early tuberculous glands frequently shows a relatively high lymphocyte count, while in Hodgkin's disease the polymorphs and eosinophiles rise in percentage. Early caseation in tuberculosis makes the diagnosis simple.

Acute lymphatic leukemia is differentiated by its sudden stormy course, with history of preceding pharyngeal infection. Its enormously enlarged cervical glands, great toxæmia, high white count and rapidly fatal termination keep one but a short time undecided.

Lymphosarcomatous involvement of glands is rapid, progressive, and usually soon generalized.

In hilus gland involvement all other chronic infections of the

lungs must be eliminated. Repeated examinations are necessary. Statistics bear out the conclusion that persistent positive findings and history of exposure with a positive von Pirquet make the diagnosis of tuberculosis a safe one.

Local pyogenic infections give a regional lymphadenitis. The presence of such local lesions is enough to make the differential diagnosis.

The primary adenopathy of syphilis is differentiated by obtaining the spirochetæ from the chancre or by needling the gland.

Treatment means, *first,* prophylaxis.

Early diagnosis of cases of tertiary tuberculosis, with frequent examination of sputum, is of great importance. Infants and young children should be kept away from those individuals who are infective or doubtfully active. Breast feeding by actively tuberculous mothers is undesirable and early hand infection from them so probable that I believe the problem would be more easily solved by advising such women against pregnancy.

The child should be guarded against even short periods of exposure during its first few years.

Boiling milk kills bovine tubercle bacilli. The course to pursue in infant feeding is therefore obvious.

The care of the teeth and of a diseased Waldeyer's ring is essential if one wants to keep a child's immune power at its greatest height. Chronic and recurrent focal pyogenic infections undoubtedly lower the resistance of the glands and decrease the child's ability to obtain the essential tubercle immunity.

The infected child should be treated by removing sources of focal infection, forced feeding, forced rest, and good air. Cod liver oil is the most important drug used. Tuberculin in small doses, in selected cases, seems to aid.

If a gland shows a tendency to soften and is in a region open to surgery it should be aspirated When a group is badly involved and surgically accessible, caseation in a single gland is an indication for radical operative removal of the chain.

Surgery should be succeeded by prolonged medical and hygienic treatment.

Röntgen-ray treatment yields excellent results in many cases, often in conjunction with surgical measures.

Industrial Medicine

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THORACIC PAIN

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In private, hospital and dispensary medical practice it is astonishing to note the large number of patients, who, in tabulating their complaints, place thoracic pain at the top of the list. This is probably explicable by the fact that, to the average lay person, thoracic pain is interpreted as being the result of a disturbance in the vital function of either respiration or circulation. Pain of similar character and duration situated in other parts of the body, such as the head, back, pelvis or extremities, is usually borne with greater equanimity. To the physician pain in these situations may be of more serious prognostic import than thoracic pain, but to the patient, unless extremely severe, it is relegated to a position of minor importance, since it apparently does not then threaten functions upon which the maintenance of life itself is dependent. The attitude of the physician toward complaints of mild thoracic pain is frequently characterized by lack of interest, by reason of the fact that in the majority of cases thoracic pain is merely a symptom of a minor malady, such as bronchitis, pleurisy, etc., and yet even very mild thoracic pain, without evidence of disease of either the pulmonary or cardio-vascular systems, is so frequently the result of serious organic disease that a diagnosis of intercostal neuralgia, rheumatic pain, etc., is seldom justified.

A young woman in apparent good health presents herself, complaining of muscular pain in the suprascapular region. The muscles are firm, there is an increased sense of resistance, they are slightly tender to pressure. She has been using a liniment prescribed by a physician. Examination shows a bilateral apical tuberculosis causing muscle spasm in exactly the same way as an acute appendicitis causes abdominal rigidity.

A man of middle age presents himself, complaining of sharp twinges of pain in the chest which last only a few seconds. Examination shows myotic pupils which do not react to light. There is a narrow band of hypæsthesia and hypalgesia around the chest. The case is one of tabes dorsalis with a positive Wassermann in the blood and spinal fluid. Cases of this character emphasize the importance of careful examination and of detailed questioning as to the character, severity, duration, distribution and constancy of chest pain, and of the factors which modify it. Pain is always pathological. In the majority of cases it is the result of irritation of a sensory nerve. The irritation may be situated at any point from its peripheral to its central end. The pain is usually referred to the peripheral termination. In other cases, pain is reflected to a healthy area because of disease in another part of the body which is innervated from the same or from a neighboring segment of the cord. An example would be the cervical pain reflected through the phrenic as a result of disease in the liver, gall-bladder or diaphragm. In certain extremely rare cases pain may result from cerebral disease involving the basal ganglia. The report of the following cases is intended to illustrate a few of the conditions which may cause thoracic pain, and in which the diagnosis is not at once apparent. To discuss in detail all of the causes of thoracic pain would exceed the limits of this article and the space available for it.

Case I.—J. C., aged thirty-seven, married, white, American birth, occupation, a laborer. Complains of pain in the lower part of both sides of the chest. The pain first appeared in the left side of the chest five months ago and was localized to the lower left chest until two weeks ago. He then began to have similar pain in a corresponding part of the right side of the thorax. The pain is sharp in character, is brought on or aggravated by movement of the body and by deep breathing. It has interfered with sleep and has been severe enough to prevent the man from working for the past two months. The duration of each attack of pain is only a few minutes. The chest wall is not tender to pressure.

During childhood he had measles and whooping-cough. Eleven years ago

he had an attack of pain in the muscles and joints diagnosed as rheumatism. He denies all other illness. Has never had any venereal disease. His habits are average. He smokes cigarettes and formerly drank beer and whiskey in moderation. His appetite and sleep have always been good. His family history is negative, with the exception that his father died of what was apparently a malignant tumor of the esophagus. He has been married ten years. His wife is living and well and has had four healthy children. She had one miscarriage brought on by an accident.

Physical Examination.—Well-nourished white male who does not appear to be acutely ill. Skin and mucosa are normal. No adenopathy. No œdema. No scars on the body. Examination of the head and neck: There is an anterior deviation of the septum with considerable congestion of the left inferior turbinate. Transillumination of the frontal sinuses and antrum shows slightly diminished illumination but no evidence of pus. Each tonsil contains pus which can be expressed by pressure. There is a moderate hypertrophic pharyngitis. The teeth are in very poor condition. Pus exudes from the gums on pressure. Eyes negative. Hearing and vision normal. Neck: No glands. Thyroid not palpable.

Chest: The antero-posterior diameter of the chest is increased in comparison with the transverse diameter. The left clavicle is slightly more prominent than the right. There is no atrophy or spasm of the intercostal or shoulder muscles. Expansion is normal. Careful examination of the lungs reveals no evidence of disease. The heart is of normal size, shape and position. The rate is 70 and regular. The tones are normal. Systolic blood-pressure, 112; diastolic, 82. Abdomen negative.

Nervous System: Corneal, pharyngeal, abdominal and cremasteric reflexes present and normal. Normal plantar flexion. The tendon reflexes of both the upper and lower extremities are brisk and equal. Tactile sensibility and sensibility to pain is normal throughout, even in the area in which he experiences pain.

Spine: The posture is erect. There is no curvature. Normal lumbar curve. There is no loss of mobility and no pain is caused by lateral bending or by rotation. Forward and backward bending cause pain and are associated with a moderate limitation of motion. With the patient reclining in the prone position, efforts to lift the extended legs cause pain in the upper lumbar part of the spine. The muscles of the spine are in spasm. On deep percussion with the closed

fist slight tenderness is elicited over both sacro-iliac joints, and marked tenderness between the seventh and twelfth dorsal vertebræ. No tenderness in the cervical or lumbar spine. A tentative diagnosis of arthritis of the spine was made, while the laboratory and X-ray examinations were being made.

The urine was negative. Prostatic smears negative. Wassermann negative. Leucocytes, 12,500. The radiographer reported "X-ray of spine shows a hypertrophic arthritis of the lower dorsal spine without visible changes in either the lumbar or sacroiliac region."

This patient had been under treatment with sodium salicylate as a case of "rheumatic diathesis." Obviously the proper treatment would consist in an effort to eradicate the numerous foci of infection in the head, and immobilization of the spine by a plaster cast or a body brace. Sodium salicylate undoubtedly abated the pain somewhat, but it could hardly be expected to arrest the progress of the disease. If the condition is not arrested, the man will be hopelessly incapacitated within a few years.

CASE II.—A. D. is a Lithuanian miner, aged fifty-seven years, who, on August 8, 1919, while working in a mine, was injured by the fall of a pile of slate. Radiograms made on August 9th showed a definite fracture of the ninth and tenth ribs on the left side at a point about four inches from the spine. Radiograms made on October 14th, 1919, showed heavy callus formation on the ninth and tenth ribs with a lesser amount of callus on the eighth rib. Following the fracture, the patient was confined to bed because of pain in the chest, especially at the site of the fracture. He had no cough and there was no spitting of blood. He denies ever having had pain in the chest prior to the injury. At the time of the examination, April 9, 1920, he complained of a dull pain in the left chest limited to the area supplied by the lower intercostal nerves. The pain was aggravated by reclining on the left side, and ever since the date of injury the patient has been compelled to sleep while lying on the right side.

Physical Examination.—Chest: Examination showed it to be emphysematous, the antero-posterior diameter being increased. No abnormal pulsations were visible or palpable. The left side of the chest showed a moderate limitation of motion with considerable lagging. Cog-wheel breathing was heard all over the left chest, both front and back; otherwise, physical examination of the lungs was negative. There was a narrow band of hyperalgesia extending around the chest from the spine to the sternum, following the left eighth rib.

The area of cardiac dulness extended from a point two and one-half inches to the right of the sternal edge to the left midclavicular

line. Substernal dulness was increased to a point as high as the second rib. The arch of the aorta could not be palpated. There was no tracheal tug. The voice was normal, and there was no cough. The peripheral vessels were not palpably sclerotic. The left radial pulse was almost obliterated, while the right was of normal volume. Systolic blood-pressure in the right arm was 115 and diastolic was 80. On auscultation the second aortic tone was found to be markedly accentuated, but no murmurs were audible over any part of the chest. The mitral tones were normal.

The Wassermann test on the blood gave a strongly positive reaction.

Radiograms were made and showed a sacular aneurism of the descending arch. The pictures made just after the accident were on small plates and did not show the aneurism.

When the ascending arch of the aorta, or the part extending from the aortic orifice to the innominate orifice, is the site of aneurismal disease the aortic ring is usually involved and the symptoms of aortic insufficiency appear. The physical findings indicating aneurism are, then, usually in the neighborhood of the second and third right intercostal spaces. Erosion of the sternum with marked sternal pain may be present and the right recurrent laryngeal nerve may be involved.

Aneurism of the transverse arch usually indicates its presence by swelling in the suprasternal notch. Any or all of the structures in the neck may be compressed by the dilatation.

Aneurism of the descending arch and descending thoracic aorta extend backwards and to the left. They are more likely to cause spinal pressure than sternal pressure, and thus give rise to irritative symptoms in the distribution of the intercostal nerves.

The case herewith reported is of interest because of the definite history of fracture with excessive callus formation on the eighth, ninth and tenth ribs of the left side at a point very close to the spine. The pain, however, was in all probability the result of the aneurism and not of the fracture of the ribs.

Case III.—E. K., a white male, aged forty-five, presents himself for examination because of (1) a sensation of heaviness and stiffness of the left arm; (2) limitation of motion at the shoulder; (3) pain and tenderness of the left side of the thorax, left shoulder and arm, which is exaggerated by excitement, by motion, by rapid breathing, etc. Two weeks ago he had a very severe attack of pain of only a few seconds' duration, but of intolerable severity, involving the left thorax and arm. He feels little discomfort when at rest and if the arm

is supported. He also complains of weakness and nervousness, and irregularity of the heart.

His history is to the effect that while engaged in staining wood a piece of the wood lodged beneath the nail of the left index finger. This occurred seven months ago. Two days later he suffered from severe pain in the finger, had a temperature of 104° with chills. The finger then discharged pus, and about this time he developed an axillary swelling, which was poulticed for two weeks. During this period he had a continuous high fever. After the two weeks' poulticing his physician incised the axillary swelling with the liberation of a large amount of pus. He continued to have a daily high temperature for another week and at several times his life was despaired of. The axillary abscess drained for seven weeks. Since the infection he has been unable to work because of pain, weakness and loss of function of the arm. Prior to the infection he had good health. He never suffered from pain in the chest or arm. He denied venereal infection. His habits were average.

Physical Examination.—The patient presents many evidences of premature senility, such as sparse and extremely gray hair, visible temporal vessels, lax skin, sunken cheeks and flabby musculature. His actual age is forty-five. His apparent age is sixty. He does not appear to be acutely ill. During the examination he coöperated with the examiner. There was no attempt to exaggerate the degree of his disability.

Head and Neck: Scalp negative. No tenderness over the sinuses or mastoid. The scleræ are pearly white. The conjunctivæ are pale. Pupils are equal in size, regular in outline and react to light and accommodation. Visual fields are normal; fundi normal. Ears negative. Hearing normal. Nose and pharynx negative. Teeth are in bad condition. Many are missing. The gums exude pus on pressure. There is no evidence of a lead line. A lymphatic gland the size of a bean is palpable under the angle of the jaw on the right side. The thyroid is palpable. No nodules.

Upper Extremities: There is a well-marked atrophy of all the muscles of the left shoulder girdle and arm, apparently due to disuse. They are smaller, softer and less powerful than the corresponding muscles of the right side. Forced motion in all directions produces crepitus. Pressure and motion cause pain under the tip of the acromion. Voluntary abduction is limited to 40 per cent. of normal. Rotation limited to 50 per cent. of normal. All other movements of the shoulder are limited to 50 per cent. of normal. Radiographic examination of the shoulder showed only a slight rarefaction of the bone due to disuse.

Chest: The thorax is of normal appearance. Expansion at the base is equal and normal. Percussion, auscultation, etc., revealed no evidence of pulmonary disease.

Cardio-vascular: The temporal arteries are visible and palpably sclerosed. The brachialis are also visible and palpable as hard bands. There are no isolated areas of calcification, but all the superficial arteries are difficult to compress. The veins of the entire left leg, including the external saphenous up to the inguinal region, are very markedly varicose. The heart is normal in size, shape and position. The rate is 84, while seated. No arrhythmia. The second aortic tone is accentuated. No murmurs are audible over the valve areas. In the left axillary space a faint blowing sound is heard synchronous with each cardiac systole. Systolic blood-pressure, 170; diastolic, 100. An X-ray of the chest was not obtained.

Nervous System: The tendon reflexes are present, equal and brisk. The superficial reflexes are also normal. Sensation was not tested because of the man's condition.

Laboratory Report: Erythrocytes, 4,848,000; leucocytes, 9200; hæmoglobin, 65–70 per cent.; Wassermann test, negative; urine, negative.

Immediately after recording the above observations and while the patient was still undressed he suffered from three distinct and separate attacks of agonizing pain in the left chest, left shoulder and arm and left side of the neck. During the attacks he screamed, clutched at his chest and neck, threw his head backward and complained that he was choking. Each attack lasted about forty-five seconds. Following them he was prostrated. The face was suffused and perspiring. The pulse-rate increased to 120. Systolic pressure fell to 150, while diastolic pressure remained at 100. An attempt was made to take the blood-pressure and listen to the heart during the first attack, but the movements of the patient caused by the intense pain made it impossible. At the beginning of the third attack an inhalation of amyl nitrite gave prompt relief.

A diagnosis of angina pectoris was made on the history of a previous attack, the presence of arteriosclerosis, and by observation of the patient during an attack. A diagnosis of sub-deltoid bursitis was made on the finding in the left shoulder.

Angina pectoris is not a rare condition, and in the average case

complaining of pain in the left chest and left arm, when associated with general arteriosclerosis, etc., it would be the first disease to occur to a physician as an explanation of the symptoms. In this case the evident disease of the shoulder-joint with the history of infection complicated matters. Fortunately the man had an attack while in the office, which left no room for doubting that he suffered from two distinct types of pain, the one due to local disease and the other reflex from cardiac disease. It is quite probable that had an X-ray examination been made of the chest we would have discovered marked sclerosis and dilatation of the aorta which were not detected by the ordinary physical examination. The arteriosclerosis is of longer duration than seven months, so that it would not be just to state that the anginal attacks were the result of the axillary infection. Granting that the infection did not cause the angina, yet it is almost certain that such a severe illness would aggravate the disease already present and for that reason, under the laws of Illinois, the man is entitled to complete permanent disability.

INTERNAL DISLOCATION OF THE RIGHT ELBOW

E. M., aged twenty-six years.

History of Present Condition.—On October 1, 1920, this patient, while working on a corn binder, caught his right arm in a revolving wheel and belt. The belt and wheel caught his wrist, throwing his arm against his side and carrying the forearm further in rotation, the inside of the arm striking the side of his chest. Rotation carried the forearm further away from the median line of his body, carrying the hand and forearm into extreme supination and throwing the whole weight of the revolution on the elbow joint, with one end of the lever at the place where his arm was caught in the belt, the other end of the lever on the internal lateral ligament of the elbow joint and the fulcrum was the head of the radius pressing against the external condyle of the humerus. The internal lateral ligament gave way and the upper articular surface of the ulna was pried away from the trochlea humerus and forced inward. The head of the radius was then torn loose by a continuation of the force and this was then carried inward so that it rested in the normal position of the ulna on the humerus, the ulna being displaced entirely internal to the humerus, the olecranon striking the internal epicondyle. (See Fig. 1.)

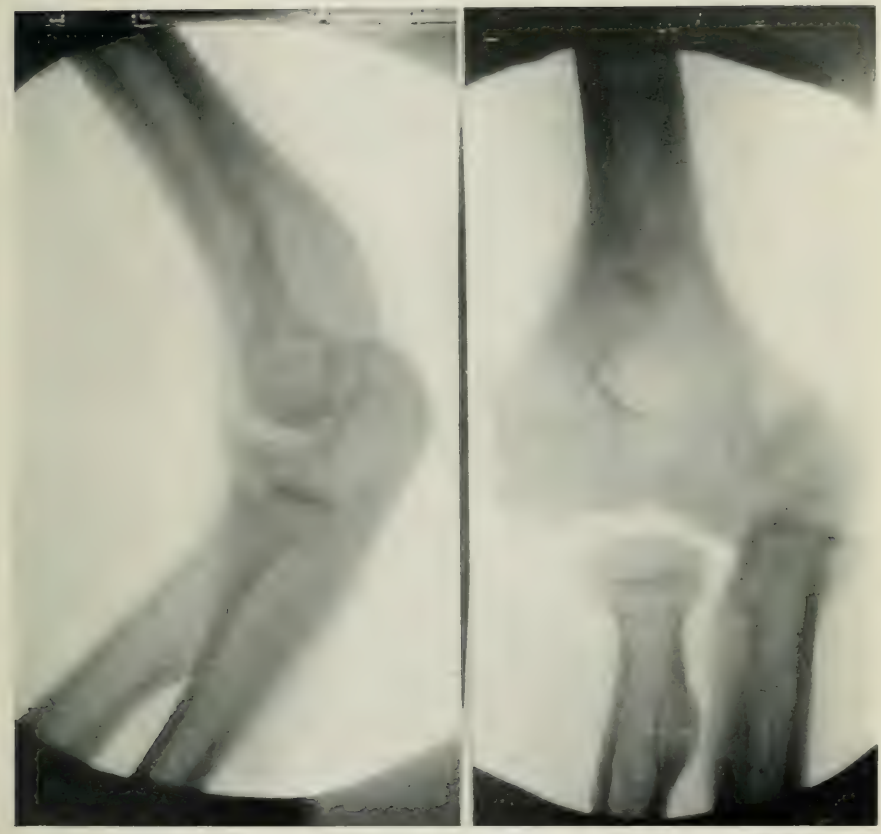
Treatment.—An attempt was made to reduce it almost immediately, which was followed by immobilization of the arm at a right angle. The patient returned to his home and after a week removed the fixation dressing, tried to use his arm and, in spite of the fact that there was little or no swelling at that time, he says, he could not flex

the arm beyond a right angle or extend it more than 15 degrees beyond a right angle, this 15 degrees of motion being the only motion present. He returned to his physician, who examined it and assured him that it was in proper place and that he must use it to have full motion restored. Having somewhat of a "Missouri" disposition, he traveled to a neighboring town and had an X-ray taken in the antero-posterior and lateral plane, which showed that the radius and ulna were still displaced inward on the humerus. He decided, therefore, to make further attempt to have the condition corrected and came to our clinic for that purpose.

Operation.—Preparations were made for operation, but before the arm was prepared an attempt was made to reduce the dislocation under ether anæsthetic, using the method of traction which is described in a subsequent paragraph. This was entirely unsuccessful in spite of the fact that a tremendous pull was exerted. The patient was, therefore, operated.

First incision was made over the external condyle of the humerus and the joint cavity opened; from this angle an attempt was made to bring the head of the radius into position and use this as a fulcrum to pry the ulna over the troclea and back to its normal location. It was impossible through any external incision to replace either the radius or the ulna. Therefore, an incision was made opposite the first and the ulnar nerve looked for immeditely. This was found to be displaced anteriorly over the internal condyle, laying over the pronator radii teres, and had it not been looked for specifically as soon as the skin incision was made or any further dissection attempted, it would have been almost the first thing to have been cut in its abnormal position. This nerve was dissected out and displaced further forward out of the field of operation. The internal lateral ligament of the elbow-joint was then severed and the gloved finger of the operator run through from the outer incision to the inner incision and used as a pry and skid. There was a very considerable force necessary to replace these bones even with the direct force applied. The operator was almost incapacitated from further use of his hands for several days on account of traumatism, but the joint surface was saved from any possible scratching or irritation on account of the smoothness and softness of the application of the lever. The reduction was finally accomplished. The ligaments on both sides of the

Fig. 1.



Internal dislocation of the right elbow, showing olecranon at internal epicondyle, and head of radius in normal position of ulna.

FIG. 2.

Method of traction for reduction of fractures of humerus, radius and ulna.

joint were sutured with fine catgut and the ulnar nerve replaced behind the internal condyle.

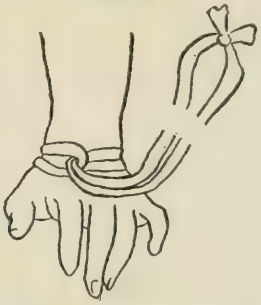
The arm was put up in acute flexion, with the cast put on as a figure-of-eight around the forearm and upper arm, the elbow being entirely exposed, inasmuch as a cast over the point of the elbow is extremely uncomfortable and entirely unnecessary to hold an arm in flexion, the object of the flexion being to lock the coronoid process in the coronoid fossa, this being accomplished by flexion only. Any apparatus which will hold the arm in flexion will immobilize the elbow-joint. A simple wrapping of soft layers of plaster bandage, one full turn around the wrist, the bandage then brought around the upper arm with a full turn around this and back on the opposite side with another full turn around the wrist, this being repeated so that it makes a figure-of-eight, which bridges between the upper arm and the wrist. This leaves the elbow entirely exposed, allows the patient to use the hand and rotate the forearm, and is a much more comfortable dressing than a splint applied upon the back of the upper arm and up the back of the forearm, in the manner of the customary dressing.

Comments.—It should have been an easy matter without the aid of X-ray for the examining physician to determine this dislocation had not been reduced. The internal condyle, the olecranon and the external condyle are almost equidistant normally, and with the arm flexed at right angles these three points should be in line. If he had felt for the head of the radius where it articulates with the external condyle, he would have found there was no rotation of the radius to be felt, the radius being displaced fully an inch and a half towards the inner surface of the arm. It also should have been recognized that when a dislocation is replaced properly there is little or no swelling and almost a full range of motion should be possible immediately. There is no bony blocking or contracture of ligaments which can occur in a simple dislocation which will prevent all but 15 degrees of motion in an elbow. It should also have been noticed that the blocking in this case was distinctly bony, that flexion or extension came to an abrupt stop with almost a click, which indicates in almost every instance bony blocking rather than ligamentous contracture. There is usually a little spring at the end of motion when the motion is stopped by ligamentous contracture, although this is not the case sometimes where a contracture is old and very hard.

Method of Traction.—The method of traction used to reduce fractures in the humerus, radius and ulna is shown in Fig. 2. Everyone who has attempted to set fractures in the arm or forearm recognizes that it is practically impossible to secure traction sufficient to reduce the fragments into anything like perfect alignment by gripping the member with the hands and putting on traction which depends upon the operator's grip as well as his pull. The very force that is used for this procedure blunts the delicacy of touch and further interferes with proper reduction, and it is to avoid the necessity of using one's hands to make traction that the bandage loop method was devised.

To secure proper traction, there must always be counter-traction. Therefore, the first requisite is to place a patient on a table or couch

FIG. 3.



Loop used in method of traction for reduction of fractures of humerus, radius and ulna, as shown in Fig. 2.

and securely fasten him to it, so that the traction will not drag him to the floor. This is accomplished by passing a sheet under the arm with a good pad in the axilla and fastening the two ends of the sheet to the side of the table opposite the injured member, one end of the sheet passing under the patient's body and the other one over his chest. The ends can be tied around the leg of the table or fastened in some other way which may be convenient.

We are now in position to put any amount of traction on the patient's arm without displacing him from the object on which he is reclining. A strip of heavy muslin bandage about four inches wide and a yard and a half long is knotted in the form of a loop or continuous ring. This loop is thrown around the patient's wrist (see Fig. 3) and over the operator's shoulder. The operator's foot can

then be placed against the table; he has the whole traction of his weight as well as the pushing power in his leg to apply the traction, which gives continuous, strong and steady traction and leaves both hands perfectly free to manipulate the fragments as may be found necessary. It is the steady, constant pull which tires out muscle spasm and allows the fragment to pull into line, and with the fingers free and sensitive to touch the fragments may be adjusted in a much more satisfactory way than can be accomplished where there is intermittent pull exerted by the operator's hands.

SEPARATION OF LOWER EPIPHYSIS FEMORIS WITH SCHLATTER'S DISEASE

By George G. Davis, A.B., M.D., F.A.C.S.

Assistant Professor of Surgery, Rush Medical College, Chief Surgeon Illinois Steel Company

Separation of the lower epiphysis of the femur is not an infrequent finding in the realm of traumatic surgery. Neither is Schlatter's disease to-day a rarely diagnosed condition. But separation of the lower epiphysis femoris as the etiological factor in Schlatter's disease seems of sufficient interest to be noted.

The surgical anatomy of interest in this condition concerns chiefly the centres of ossification and the epiphyseal lines at the lower ends of the femur and the upper tibia. The femur is ossified from five centres: One for the body, one for the head, one for each trochanter and one for the lower extremity. Ossification in the lower end of the bone starts at the ninth month of fetal life, and it is from this centre that the condyles and epicondyles are formed. The epiphysis of the inferior extremity is not joined to the body until the twentieth year.

The tibia is ossified from three centres (see Fig. 4): One for the body and one for either extremity. Ossification begins in the centre of the body, about the seventh week of fetal life, and gradually extends toward the extremities. The centre for the upper epiphysis appears before or shortly after birth. It is flattened in form and has a thin tongue-shaped process in front, which forms the tubercle. The upper epiphysis joins the body about the twentieth year.

Separation Epiphysis Femoris.—The term traumatic separation of the epiphysis refers to a separation of the epiphysis that has not

yet become united by bone with the shaft. Separation of the lower epiphysis femoris is relatively frequent. Although in some cases the epiphysis is not united with the shaft before the twenty-fifth year, there are no cases reported in which the patient was more than twenty years old.

Brunn [1] collected eighty-one cases in which there were one hundred and one separations; the points of greatest frequency were the lower end of the femur (28), lower end of radius (25), and upper end of humerus (11). Delens [2] was the first author to write a comprehensive paper dealing with the separation of the lower epiphysis femoris. Later papers appeared by J. H. Packard,[3] J. Hutchinson, Jr.,[4] R. H. Harte,[5] A. H. Meisenbach [6] and McBurney.[7]

The etiology of these cases appears usually to be by cross-strain, the limb being bent beyond the limit of normal motion in the joint or in a direction in which there is no motion, that is, lateral bending of the knee. A large number of cases has been caused by the engagement of the leg between the spokes of a revolving wheel. Cases occurring in infants during delivery by the feet have been thought to be due to direct traction. The case reported in this paper was due to direct violence.

The displacement may be very slight or so great as wholly to separate the fractured surfaces from each other. It may occur in any direction: forward, backward, inward or outward. The common displacement of the epiphysis is forward and the periosteum is always stripped from the shaft of the femur but remaining attached to the epiphysis. The ligaments of the knee-joint remain intact and the epiphysis retains its normal relationship to the tibia.

Complications are not infrequent. With a torn capsule there may be a hemarthros of the knee. Pressure on the popliteal vessels may cause circulatory disturbances, gangrene or aneurism. Severe laceration of the vessels may necessitate an amputation. Nerve lesions also are not uncommon complications. Arrest and diminution of growth of bone may result from injury to the conjugal cartilage.

In incomplete separation the reduction may be accomplished under an ether anæsthesia by traction on the flexed lower leg with counter-traction of the thigh. In complete displacement, if the above method fails, an open operation with the incision on lateral aspect of the upper limb in front of the tendon of the biceps is indicated. The post-

operative treatment of placing the patient in a Pearson's modification of the Thomas splint, with overhead suspension, has worked most satisfactorily in the writer's case, resulting in no loss of motion of any joint and no tendency on the part of the fragment to slip. This seems a much more desirable after-treatment than immobilization in full flexion of the knee as advised by Hutchinson.

Complete separation of the upper epiphysis tibiæ is rare. An incomplete or "starting of the epiphysis" (Schlatter's disease) is not an infrequent accompaniment of sprains of the knee in adolescents, the tubercle of the tibia being loosened by a pull on the ligamentum patellæ with periosteal thickening resulting. This condition is not unlike a "sprain fracture," described by Callender in 1870, which is caused by separation of a ligament from its point of insertion with a small shell of bone.

Though Müller [8] wrote the first special paper on this subject, other authors, Schlatter,[9] Osgood,[10] Keyser,[11] Landsberg,[12] Ware,[13] Gaudier and Bouret [14] and Linkenheld [15] have written more completely on the subject and the condition is frequently spoken of in this country as "Osgood-Schlatter's Disease."

The ligamentum patellæ is inserted into the tubercle of the tibia. And in practically all cases the force has been indirect violence, the quadriceps transmitting unusual effort to the ligamentum patellæ usually in jumping and generally in youths between twelve and eighteen years of age. Direct violence has been a factor in but few cases. It is essentially an injury of childhood and early adult life.

Following this injury the knee generally becomes distended by effusion, and the patient cannot extend the leg immediately after the injury, and this lasts for several weeks. The avulsed, movable, bony process in abnormal position may be noted in cases where the tubercle has been fractured and crepitus may be felt. The displacement, as a rule, is not great, as the tubercle tibiæ is not the sole insertion of the ligamentum patellæ. The portion of the tibia about the tubercle also cares for a part of the insertion of the ligamentum patellæ.

If the tubercle is pressed into place and held there with adhesive or bandage, a good recovery is the history in these cases. The extended position of the limb for four to five weeks has been the usual treatment. Operative treatment is probably never necessary.

REPORT OF CASE.—F. A., a Spanish laborer, aged sixteen, on August 26, 1920, was sitting on a bench, the height of which was eighteen inches. His feet were on the floor and the lower legs were thus at right angles to the thighs. His fellow workers were handling a bar, which weighed about seventy-five or eighty pounds, and this accidentally fell across the patient's knees.

He was taken to the hospital and an X-ray examination revealed the following (see Fig. 5): The lower epiphysis femoris was dislocated anteriorly at an angle of about 22½ degrees, hugging the lower and anterior aspect of the shaft of the femur. This brought the lower articular surface of the femur in intimate contact with the articular surface of the patella and thus put the ligamentum patellæ on tension. The posterior portion of the articular surface of the epiphysis remained in contact with the articular surface of the tibia, in which position it was at the time of injury.

The tubercle of the tibia is definitely separated from the shaft of the femur and shows the greatest separation at the apex of the tubercle, the gap becoming smaller as it approaches and continues into the epiphyseal line of the tibia.

Under ether anæsthesia the dislocation was immediately reduced. Reduction was accomplished by traction of the lower leg with leg at right angles to the femur, with counter-extension. The patient's limb was then placed in a Pearson's modification of a Thomas splint and motion of hip, femur and ankle-joints were encouraged from the first day.

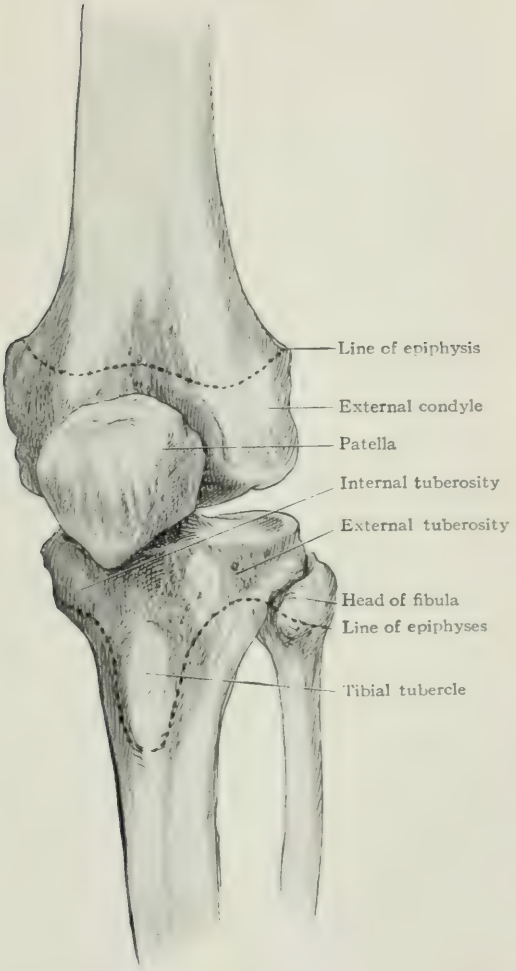
On September 20, 1920, his limb was taken from the splint and all dressings removed. There was almost perfect motion. Massage and passive motion were continued and active motion encouraged.

On October 15th it was noted that there was good bony union at the site of the separation of the epiphysis femoris; there was perfect motion of the hip-, knee- and ankle-joints and there was no swelling of the soft tissues. He walked without a cane or crutch with a barely perceptible limp, which he attributed to a slight pain in the knee.

He was discharged and returned to work on October 25th, two months after the injury, without any resulting disability.

X-ray plates (see Figs. 6 and 7) taken October 10, 1920, showed the fragments in good alignment with an abundance of callus, which is especially noticeable on the anterior aspect at lower end of shaft of the femur where the periosteum had been stripped.

Fig. 4.



Showing upper epiphyseal line of the tibia. The tibia has three centres of ossification, one for shaft, one for lower epiphysis and one for the upper epiphysis with its tongue-like projection forming the tubercle of the tibia.

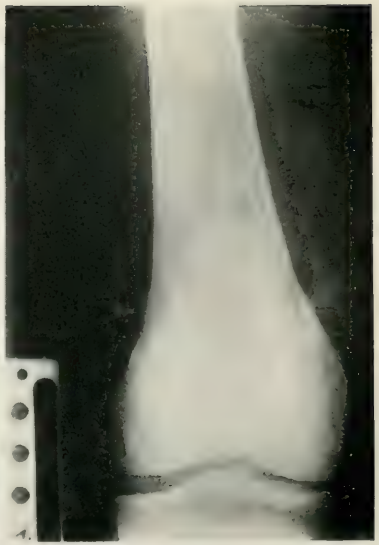
Fig. 5.

Showing anterior displacement of the lower epiphysis femoris, forcing the patella anteriorly and causing separation of the tubercle of the tibia (Schlatter's disease).

Fig. 6.

X-ray six weeks after injury and reduction, lateral view, showing epiphysis of the femur in place and considerable amount of callus at the lower end of the shaft of the femur anteriorly where the periosteum had been stripped by the anterior displacement of the epiphysis.

Fig. 7.



X-ray six weeks after injury and reduction—antero-posterior view—showing good alignment of fragments

Fig. 8.

Scar ¼" wide on weight bearing surface. Patient cannot walk without severe pain.

Fig. 10.

Lung abscess, X-ray by Dr. Hollis Potter, showing infiltration of the right lung at a point just above the hilus, consisting of a mass about the size of a hen's egg.

FIG. 11.

Faulty weight-bearing line in the tibia-fracture of both bones of left leg, with resulting posterior bowing of the tibia, which brings the foot, when the knee is straight, so that the heel is on a line with the anterior part of the thigh.

The mechanics of this fracture is readily understood. The tibia was perpendicular and the femur was at right angles to it with the posterior portion of the articular surface of the femur resting upon the articular surface of the tibia. The force landed upon the lower portion of the shaft of the femur causing the lower end of the shaft to separate from the epiphysis and be dislocated posteriorly. The epiphysis resting upon the articular surface of the tibia being dislocated anteriorly with respect to the shaft of the femur. This anterior dislocation of the epiphysis brought the epiphysis in contact with the articular surface of the patella and pushed it anteriorly. This force upon the patella in turn was transmitted via ligamentum patellæ to the tubercle of the tibia and caused the separation of epiphysis tibiæ (Schlatter's disease), which was most marked at the apex of the tubercle of the tibia.

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RELATION OF TRAUMA TO TABES DORSALIS

By Ralph C. Hamill, M.D.

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For many years trauma was considered one of the important causative factors in the etiology of tabes dorsalis. In fact, this was true until the mass of evidence, including the Wassermann reaction and the finding of spirochetæ in the meninges and in the tissues of

the cord proper, proved beyond the question of a doubt that all cases of tabes are due to syphilis. When one wonders why trauma ever was considered as a possible cause of tabes, one is obliged to recall the fact that fifteen to twenty years ago, in fact, one might almost say yesterday, physicians took the word of the patient upon the subject of his disease at its face value. Hence, if a man said that the symptoms from which he was suffering dated from, or began with, an injury it was confidently believed, not only by the patient but also by the doctor, that the injury was the cause of the symptoms.

There is one point in the relationship of trauma to the symptoms of tabes which needs to be more fully considered. Beyond question there are symptoms of tabes the incidence of which is directly attributable to trauma. The following case is an example of this sort.

Case of A. B., a man forty-two years old, married twenty years, with six living, healthy children, was injured in the summer of 1918. A mule stepped on his foot, severely injuring his left great toe. Gangrene set in and a month later the great toe was removed. Before it was amputated it was "as black as your hat." The wound has never completely healed. The patient denied venereal infection and stated that his wife had had no miscarriages. Since the injury he has started to work several times, but each time his foot swells and the end of the first metatarsal becomes painful. He complains also that for the last year it has been somewhat difficult for him to hold his urine. He has suffered from sharp pains down the left leg since the injury. Physical examination shows that the left pupil is dilated, fixed to light, but reacts to convergence; presents, the Argyll-Robertson reaction. The left lid droops slightly, there is some increased swaying in the Rhomberg test, and the ankle and knee jerks are absent. Plantar, cremasteric, abdominal, wrist, biceps and triceps reflexes are normal. The Achilles tendons, the testicles and the ulnar nerves do not feel deep pressure as painful to a normal degree. There seems to be a zone of diminished sensation around the lower chest. The left great toe has been removed.

There can be no doubt about the diagnosis of tabes. The combination of an Argyll-Robertson reaction, poor bladder control, and loss of ankle and knee reflexes is diagnostic of tabes and nothing else. When, then, is the relation of trauma to the case, and why bring in the matter of tabes at all?

This man is asking compensation for the loss of a toe and for disability consequent to the failure of the healing of the stump. It is quite possible that he would have lost his toe from the crushing received, and that an infection of the bone and soft parts would prevent

proper healing. However, one is forced to think of the perforating ulcer of tabes in connection with this case.

The trophic ulcer is a lesion or complication of tabes not having the frank relation to trauma such as is seen in the case of the patient, A.B., and yet it is possible that trauma in the presence of syphilitic, vascular and trophic changes is the cause of the perforating ulcer. In many cases this ulcer occurs just below the hypertrophied ends of the bones constituting a small Charcot joint of the great toe. It is possible that the breaking down of the soft tissues below these bones is due to the repeated traumata of walking; the poorly nourished tissues cannot recover from the effects of traumata. In the history of A. B. it is to be remarked that the stump breaks open whenever he tries to work; in other words, whenever he stands on his feet for any length of time; *i.e.,* subjects the soft parts to increased trauma. It is also possible that he would not have lost his toe if syphilis had not predisposed to vascular failure; before the toe was amputated it became gangrenous.

It is difficult in a case like this to properly apportion the responsibility. Without question the trauma is at fault, but is it to receive the entire blame? Is the man to receive full compensation, or is the presence of syphilis to be weighed? From a medical standpoint without doubt syphilis must bear a considerable share of the blame and it would seem that the same point of view should obtain in the awarding of compensation.

FRACTURE OF THE FIBULA, COMPLICATED BY VARICOSE VEINS

C. K., aged fifty-two, laborer.

History of Present Condition.—May 27, 1920, this man received a simple fracture of the fibula of the right leg about the middle. He was put up in a cast for four weeks, after which time the cast was removed and the man urged to use the leg. He says that the leg, since that time, has been swollen and that he cannot use it on account of pain. He does not, however, refer the pain particularly to the site of the fracture, but claims that it gives him pain from the knee to the end of the foot.

Examination (November, 1920).—Examination shows no excess callus around the site of the fracture in the fibula; it does show, however, large varicose veins in the foot and leg. There is some pitting on pressure. There is tenderness of the plantar fascia over its an-

terior and posterior attachments and tenderness on pressure over the scaphoid. The fracture is perfectly healed without displacement. There is no atrophy of the muscles of the leg so far as can be determined with the amount of œdema present, and it is believed that the pain this individual is suffering is entirely due to the varicosities which cause poor circulation following immobilization in the cast. There are no varicosities in the opposite leg.

Comments.—This examination was made on November 4th, and since May 27th this individual has done no work on account of the pain which he claims is in the leg, and which we have reason to believe is really present. Here is an individual who has been out of work almost five months on account of a simple fracture of the fibula, which it was not necessary to immobilize in any way. A simple fracture of the fibula without displacement, when it occurs two or more inches above the ankle-joint, is a negligible affair. The fibula serves no function above the ankle-joint except as an attachment for muscles and as a slight brace for the tibia, and a fracture through it has no tendency to displace and causes very little if any pain after the first ten days.

Here is a man of fifty-two years, who has varicose veins and had varicose veins at the time of the injury, who was immobilized for four weeks in an unnecessary cast, which further decreased the already poor circulation in this limb, and as a result of this immobilization in conjunction with the varicosities, has had a five months' disability, which should not have been more than four weeks' disability.

It should have been recognized that any fracture in an individual with a condition of this kind should be treated as soon as possible by mobilization and massage. The massage should have been started with the stroking motion towards the centre of circulation, immediately following the fracture. Even had it been a fracture of both bones of the leg this should have been instituted in order to promote a healthy condition of the member. In this particular case the patient should have been fitted with a supporting stocking within ten days or two weeks after the injury, and this supporting stocking should have been supplemented by massage and exercises.

If there was tendency to eversion of the foot on account of weakness of the tissues and faulty standing position, then the arch should have been supported by a felt pad, as described in a previous issue,

and the inner margin of the shoe built up one-eighth inch to throw the weight on the outer weight-bearing part of the foot. In this way the arch strain which is now present and is partly due to faulty walking and standing position and partly due to poor circulation and consequently poor nutrition of the ligaments, could have been avoided.

Treatment instituted at this time will cause another sixty or ninety days' delay, and the patient will have lost seven or eight months' earning capacity, the company be out six or seven months' compensation instead of one month, and it is doubtful as to whether as good a result could be obtained at this time as could have been obtained if proper treatment had been instituted in the beginning.

SCAR ON WEIGHT-BEARING SURFACE

W. R., aged twenty-three, laborer.

History of Present Condition.—May 7, 1920, this patient's right foot was caught between the inside and outside tracks of a power transmitter, crushing the middle of the foot. The middle toe had been amputated at its base. There is a semi-circular scar running from the middle toe on the ball of the foot, ending just proximal to the ball of the great toe. This scar is about a quarter of an inch wide and firmly adherent to the ball of the foot. Patient now complained that he cannot walk without severe pain unless he rests his whole weight on the heel of the foot, which statement is undoubtedly correct. This scar is the result of the injury and not the result of a surgical operation, and could not be avoided. (See Fig. 8.)

Comments.—Any scar on a weight-bearing surface, whether it be a stump in an amputation or the result of an injury to the sole of the foot, is a constantly painful affair. It constitutes a ridge which presses on the sensitive periosteum over a comparatively small area, and no weight can be borne with comfort for any considerable period of time. The skin on the sole of the foot is a highly specialized tissue and is developed from ages of weight-bearing. This skin cannot be excised or injured in such a way that it will leave a scar without leaving a permanent disability. Therefore, it is useless to excise the scar in this case, or any other case, where weight-bearing occurs at the point of the scar, since excision of one scar simply allows another to form in its place. Therefore, it may be estimated, when injuries occur which will in all probability leave cicatricial tissue on the weight-bearing surface, the prognosis is extremely unfavorable so far as the future use of that member is concerned, and this should be taken into consideration at the time the injury occurs and every effort made to

minimize the cicatrition at any weight-bearing point. Skin grafts in various forms have been attempted following burns of the feet or evulsions of operations of the heel and so far as our knowledge goes have been entirely unsuccessful in developing skin which will stand the pressure of the average individual's standing weight. Such grafted skin invariably breaks down and leaves again a raw surface. Any severe lacerations of the skin of the sole of the foot, it is advised, rather than have a useless member, that amputation be made as soon as it can be determined that there is to be a considerable scar-tissue formation.

Treatment.—In case of ridges on weight-bearing surface of the heel which are formed by scar-tissue, the only treatment which is at all feasible is a soft, spongy leather pad, if the ridge is not too thick, or a felt pad, cut in such a way as to throw the pressure of the individual's weight entirely on the healthy skin on each side of the ridge, with a gutter cut in the felt exactly opposite the ridge. This, of course, takes away the excess pressure from the periosteum of the bone and relieves the pain.

In the case of scars or painful callouses on the ball of the foot, there are two procedures. First, a felt or leather pad fitted into the hollow of the foot just back of the heads of the metatarsals. The anterior edge of this pad must be fairly perpendicular and be a thick edge, and it must conform to the line of the heads of the metatarsals and be as close to the heads of the metatarsals as possible, without actually pressing on them. The posterior edge is beveled off and the pad should not be more than one and one-half inches at the most from front to back. The thickness is governed entirely by the amount of pressure necessary to be taken up by this pad and removed from the heads of the metatarsals, and it must be adjusted properly and by repeated fittings in order to be effective.

The second procedure, which can be combined with this, is to nail to the outside of the sole of the shoe what is called an anterior heel, which is a piece of sole leather about three-eighths to half an inch thick, fastened to the sole posterior to the heads of the metatarsals. On walking this lets the weight fall on the heel first and then come over and strike on this anterior heel, after which in the step there is a jump from the anterior heel to the toes, which almost entirely misses the ball of the foot, and consequently takes the weight from the tender

area on the ball of the foot. Both these procedures are used by orthopædic surgeons to relieve metatarsalgia and are especially effective in the relief of pain from pressure of painful scars on the soles of the feet.

It is unnecessary here to point out that in any surgical operation on the feet incision must never be made through weight-bearing surfaces.

PULMONARY ABSCESS FOLLOWING INJURY TO THE CHEST

By William H. Holmes, M.D.

J. S., aged thirty-five, married, white, Scotch nationality, fifteen years' residence in the United States. Occupation: a miner.

The patient presented himself for examination on November 23, 1920, which was the twenty-seventh day of his illness, complaining of weakness, loss of weight from 131 pounds to 116 pounds, and attacks of non-productive coughing once or twice daily, and usually between 3 A.M and 11 A.M.

Family History is entirely negative. There have been two deaths from accidental causes.

The previous personal history is also negative so far as pulmonary disease is concerned. He denies all illness with the exception of periodic attacks of gastro-intestinal disease characterized by marked flatulence, and abdominal pain, lasting from one day to a week. These attacks began at the age of sixteen and have recurred once or twice each year to the present time. Four years ago a diagnosis of appendicitis was offered as the explanation of these attacks. He was operated, but did not secure relief. In the intervals between attacks he has felt perfectly well. There has been no cough, dyspnœa, pain in the chest, night sweats, cardiac distress, urinary or venereal disease. The habits are excellent. Does not use whiskey, coffee or beer. Smokes and chews tobacco in moderation. Normal weight is 131 pounds.

Present Disease.—On Thursday, October 28, 1920, the patient was struck on the right side of the chest close to the sternum and just below the clavicle by the handle of a falling pick-axe. The injury caused some pain but not sufficient to cause him to discontinue work, nor did it leave a visible evidence of injury. The following day the mine was closed and he spent the time at home. On the third day he worked all day. He had a moderate amount of discomfort in the chest localized to the injured area. He applied an ointment to the chest in an effort to obtain relief. On the fourth day, Sunday, there was no work. He was able to be up and around, although the pain was more severe, increased by deep breathing, and was described as

being sharp and knife-like. Monday, November 1, he resumed work but had to quit because of pain in the chest and general weakness at 11:30 A.M. On Tuesday, the sixth day after injury, he consulted a physician, who made a diagnosis of pleurisy and strapped the right side of the chest with adhesive tape. The following day he had some fever. The pain was more severe. A paroxysmal non-productive cough began. He also suffered from diarrhœa. Could not recline on the right side. Failing to obtain relief he consulted a second physician, who made a diagnosis of pneumonia and ordered him to bed, which was an injunction he did not obey to the letter. On Thursday, the eighth day, the cough was more severe. During a particularly violent paroxysm of coughing he brought up a large amount of liquid yellowish sputum, which had an extremely offensive odor. Continued to cough up this sputum for about thirty minutes. Diarrhœa was still present. The ninth day the cough was much diminished and again non-productive. There was an abatement of pain. Diarrhœa continued. On the tenth, eleventh and twelfth days there were only occasional attacks of coughing, usually in the early morning hours. The diarrhœa stopped on the twelfth day, after having been present for six days.

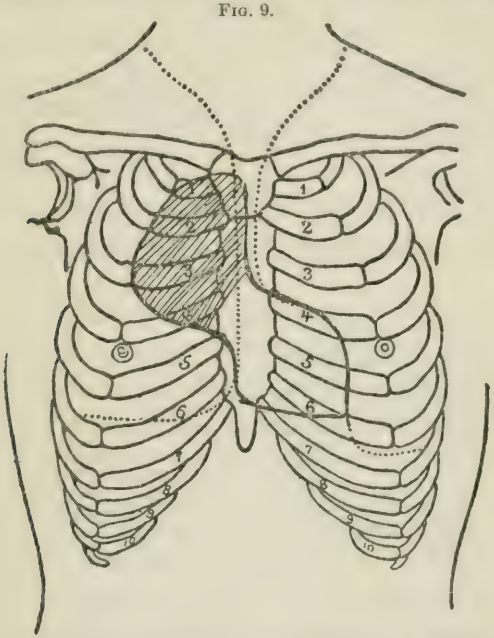
Physical Examination.—Temperature (mouth), 100.6°. Pulse (seated), 78. Respirations, 18. Systolic blood-pressure, 115, diastolic pressure, 70.

Poorly nourished white male, showing marked pallor and poor muscular development.

The chest is of normal size. The scapulæ are prominent. The supraclavicular and subclavicular fossæ are sunken. The muscles of the chest show marked myotatic irritability. No abnormal pulsations or deformities are observed. Expansion of the chest is equal on the two sides. On palpation there are no friction rubs. Tactile fremitus, percussion and auscultation are negative throughout the chest except in the area on the right side of the sternum extending from the clavicle to the fourth rib. The right border of this area forms a curving line from the clavicle to the upper border of cardiac dulness. The left border follows the midline of the sternum (see Fig. 9). In this area tactile fremitus is increased. It is dull to percussion. Inspiration and expiration are bronchial in character. Expiration is prolonged. On deep inspiration occasional coarse moist râles are heard. Wintrich's change of sound could not be demonstrated. Sputum could not be

obtained, and as the patient came from out of town for the examination there was no subsequent opportunity of conducting this important part of the examination. An X-ray picture of the chest was obtained, report of which and a fluoroscopic examination is quoted herewith: "X-rays were made of the lungs and mediastinum, which resulted in showing an infiltration of the right lung at a point just above the hilus. This consists of a mass about the size of a hen's egg, which projects from the mediastinal border at a point behind the sternal

FIG. 9.



Pulmonary abscess showing physical findings. In shaded area tactile fremitus is increased, dull to percussion; inspiration and expiration are bronchial in character, expiration is prolonged, occasional moist râles are heard.

attachment of the third rib. The borders of this mass are ragged and have finger-like projections out into the lung. There is increase in the linear structures extending downward from the hilus on the right side. The mass described is in no way attached to the heart or aorta. It is not an aneurism. It does not pulsate either by an expansile or transmitted pulsation. It is an infiltration of the lung more anterior than posterior, and, as far as the X-ray findings are concerned, it is compatible with a tumor or inflammatory process" (see Fig. 10).

Circulatory and Renal: The heart is normal in size, shape and position. The tones are clear and normal. The rhythm is normal. The arch of the aorta is not palpable. There is no tracheal tug. The vessels are not sclerosed.

Blood Examination: Red blood-corpuscles, 4,304,000; leucocytes, 10,600; hæmoglobin (Dare), 65 per cent.

Microscopical examination reveals numerous pessary cells with an occasional poikilocyte. Differential count of the leucocytes shows 80 per cent. of neutrophiles, 15 per cent. of lymphocytes, 5 per cent. of large mononuclear and transitional cells and an absence of eosinophiles and basophiles.

The Wassermann reaction on the blood was negative to two antigens, of which one was cholesterinized.

The urine was amber in color, acid in reaction, had a specific gravity of 1.025, gave a negative test for sugar, but contained a trace of albumin. On microscopical examination no blood, pus or casts were found.

Head and Neck: Scalp negative. No tenderness over the sinuses or mastoid. Nose and pharynx are negative. Tonsils are atrophic. Teeth are in fairly good condition. The mucous membranes are pale. No cervical glands. Thyroid not palpable. Eyes: Globes are sunken. Scleræ clear. No icterus. Muscular movements normal. Pupils are equal in size, regular in outline and react promptly to light and accommodation. Ophthalmoscopic examination shows normal fundi.

Abdomen: There is a moderate rigidity of both upper recti. No tenderness. No palpable masses. Liver and spleen are not palpable.

Nervous System: Myotatic irritability. Increased general muscle tone with equally exaggerated tendon reflexes. Superficial reflexes are present, equal and brisk. Sensation normal. No pathological reflexes. No tremor. Speech, hearing and vision normal.

Diagnosis.—Pulmonary abscess, connecting with a bronchus. Consolidation of the surrounding lung. Chronic sepsis causing secondary anæmia, albuminuria, etc.

Discussion.—In view of this man's negative family and personal history we are forced to assume that at the time of the accident he was not suffering from active pulmonary disease. Despite the negative history he may, however, have had pulmonary disease in a quiescent stage. The rapidity with which the condition developed following

the injury, together with the appearance of pleuritic pain on the following day, the appearance of consolidation, etc., speaks for a pneumonic process and abscess formation. The subsequent course of the disease and the physical findings also speak for an abscess. At the present time the cavity, which is probably small, fills and empties at intervals. The infection is causing daily fever, loss of weight and strength, secondary anæmia, albuminuria, etc. The pathological condition may terminate in recovery, through fibrosis of the surrounding consolidated lung, but it is much more likely to result in permanent damage to the lung, with gradual impairment of the general health through constant absorption of toxic products of bacterial metabolism. The liability in the case is obvious, since traumatic pneumonia is by no means a rare condition.

FAULTY WEIGHT-BEARING LINE IN THE TIBIA

J. C., aged thirty-two.

History of Present Condition.—April 3, 1920, patient received a fracture of both bones of the left leg at the junction of the upper and middle third. He was taken to a hospital after the accident, where he was treated with Buck's extension for the next eight days. The leg was then put up in a cast, which was found to be improperly applied, extending to the knee only. This cast was removed and a second cast put on, which was allowed to remain three days, after which this was removed and a third cast applied, which remained six weeks. The last two casts extended above the knee about six inches. The man complains now of pain at the point of fracture when he walks, pain in the knee and pain in the ankle.

Examination (October 29, 1920).—The right leg now measures, from the upper articular surface of the tibia to the internal malleolus, fourteen and one-quarter inches; left leg between the same two points measures fourteen inches. There is a marked posterior bowing of the tibia, which brings the foot, when the knee is straight, so that the heel is on a line with the anterior part of the thigh (see Fig. 11). In other words, when his foot is where it ought to be, his knee is flexed about 15 degrees. This, of course, throws an abnormal strain when the patient walks, not only on the knee, but on the ankle and a distinct cross strain at the point of fracture. Although the X-ray shows a solid bony union with posterior angulation of the fragments, this cross strain constantly applied gives considerable pain, because

the callus and the bone have not sufficiently overdeveloped at this point to hold the excess weight put upon them (see Fig. 12). Cross strain in bones will develop pain and bending unless nature throws out sufficient excess strength to withstand this strain, exactly as ligaments will give way and cause pain when they are overstrained.

This man has a marked limp, which can be accounted for very easily, when one figures that every time this patient comes up on the toe of this foot he must bend his knee in order to bring his thigh into proper position in relation to the foot, inasmuch as when he stands with his knee straight his foot is fully four inches ahead of its normal position.

The normal weight-bearing line of the leg should fall from the anterior-superior spine of the ilium through the centre of the patella to the middle toe. This line in the antero-posterior plane will give a correct weight-bearing line so far as this plane is concerned. This will also check up on the amount of rotation of the distal fragment, which, under ordinary conditions, has a tendency to rotate outward on account of the weight of the foot in a normal position being somewhat displaced towards the outer side. The fact that the foot overbalances and has a tendency towards rotating, though the fracture may be in perfect alignment at the time the cast is applied, the gradual pull of gravity on the foot will have a tendency to continue this external rotation, and it will be found that, after a number of days with a circular cast applied, the lower fragment has rotated considerably beyond its normal position and the cast, which is applied continuously over the leg, has rotated with the foot around the upper fragment.

In order to prevent this, it has been the custom of the writers, after a cast has been applied and is hardened, to incorporate in the cast by a few turns of plaster bandage a six-inch piece of thin board, which is placed on the posterior part of the cast at such a plane that it will hold the lower fragment in the proper arc of rotation to meet the normal rotation of the upper fragment, which is also slightly externally rotated on account of the pull of the stronger, external rotator group attached to the femur, and this can be checked up by the previous line mentioned between the anterior superior spine and the centre of the patella and middle toe (see Fig. 13). Now, when the patient is put to bed, the board will rest upon the mattress and

FIG. 12.

Faulty weight-bearing line in the tibia, X-ray shows a solid bony union with posterior angulation of the fragments, no excess of callus.

Fig. 134.

Device to prevent cast applied for fracture of both bones of leg from rotating out. Note piece of board placed on posterior part of cast, held by few turns of plaster bandage. This holds the lower fragment in the proper arc of rotation to meet the normal rotation, Fig. 13*B*.

Fig. 13*B*.

Of the upper fragment. Note this holds leg in normal weight line position—anterior superior spine—middle of patella and 2nd toe.

Fig. 14.

Method of obtaining traction for leg fracture without the use of the Hawley table. Foot is fastened with a clove hitch to one pulley and the other pulley is fastened to the foot of the table. Counter traction is made by means of a sheet through the thighs and fastened to the head of the table.

Fig. 15.

Method of preventing posterior bowing in fracture of both bones of leg when applying a cast. Showing piece of muslin wide as leg is long, torn into 3″ width strips leaving a continuous piece in middle. The leg is then tied up to a horizontal support above.

Fig. 16.

Method of preventing posterior bowing when applying a cast for fracture of both bones of the leg showing the alternate strips cut.

maintain a horizontal plane in the line fixed at the time of the application of the cast.

Where it is impossible to secure the use of a Hawley table or other traction apparatus, it will be found that a very satisfactory traction can be obtained by placing the patient on a table sufficiently long so that the foot will be twelve to eighteen inches from the foot of the table. A sheet folded diagonally is placed under the patient, brought up between the thighs and tied to the head of the table, over the shoulder on the side to be extended. This acts to prevent any displacement of the patient downward by traction on the leg. It is manifestly impossible to secure manual traction, which is sufficient to overcome the traction of muscles in the leg, or, for that matter, to any great extent in the arm. We must, therefore, resort to mechanical means at hand, and this can be best and most simply obtained by the use of two double pulleys, with an ordinary clothesline run through in the usual manner. One of these pulleys is fastened to the foot of the table and the other by the means of a clove hitch, which does not pull tight when traction is applied to the foot of the individual. In this way a tremendous leverage can be applied by means of the compound pulleys (see Fig. 14). An assistant with very mediocre musculature can make more traction and steadier traction and accomplish more towards reducing a fracture than a half dozen strong men using manual force. Traction in any fracture, to be effective, must be slow and continuous, but steady. If quick, sudden traction is made, the muscles react with a spasm, but slow, strong, steady traction will tire them out, will not produce reaction and will allow the fragments to be brought into line.

The cast should be applied while the traction is still maintained and, if possible, the alignment of the bone should be checked up under the fluoroscope before the cast is applied. It should be seen to that, if possible, the foot be slightly inverted rather than everted, inasmuch as during the process of healing the ligaments naturally atrophy from disuse, as does the bone, and, with the internal structures of the ankle and foot stretched and the external allowed to contract, the position of pronation of the foot occurs when the cast is removed and the weakened ligaments give way when weight is thrown upon them, and presently the condition of painful foot occurs on account of the overstrain of the ligaments. If this is allowed to continue without

proper support of the arch, building up of the inner margin of the shoe, as noted in a former issue, the condition of painful foot will continue until flat foot occurs, which will result in marked disability.

In order to prevent posterior bowing, it is advisable to give support under the leg at the point of fracture until the proper lateral plane of both fragments is reached, and this should be maintained until the cast is hard, at which time the support can be released and the cast filled in by additional plaster at the point of exit of the bandage. A satisfactory means of maintaining proper horizontal plane is illustrated in Figs. 15 and 16. A piece of muslin as wide as the leg is long from the knee to the ankle is torn into strips about three inches wide, leaving a continuous piece in the middle. The leg is then tied up to a horizontal support above and the plaster passed around the leg between the strips of muslin until the posterior part is entirely covered and has set. Alternate strips of muslin can then be cut out, one at a time, until the cast is complete. In this way any point of the extremity can be raised or lowered as desired. The extension can be applied at the same time the leg is in this sling, and where one has few assistants to facilitate the work this has proved a very satisfactory plan.

Comments.—The reason for this bowing is apparent. There was traction put on this limb sufficient to hold the ends of the bone together, but where a fracture is put up in a cast with traction, such as is obtained by the use of a Hawley table, it is necessary, not only to line the limb up in the antero-posterior plane, but also in the lateral plane. Sufficient traction will practically always bring fractured fragments into line laterally, but where the fracture occurs at a point in the limb which is almost equidistant from the two supports, one at the pelvis and the other at the foot, there is a marked tendency toward sagging at the point of fracture, and this point must be supported by a broad bandage, so that the lateral plane is carried as well as the antero-posterior plane. It would seem that the individual who treated this case had entirely neglected having an X-ray taken in two planes after the cast was put on. Otherwise, it would have been discovered that there was displacement and this displacement would have been corrected before the union of the fragments had become solid. It is very easy also to overlook a posterior sagging in a fracture of this kind when it is treated by Buck's extension only. Most mattresses sag in the middle, and unless there is some straight-edge sup-

port put underneath the limb there is every reason to believe that Buck's extension will not hold the leg in a straight line, because of the force of gravity pulling at the point of the break in continuity, and while the limb may appear to be perfectly straight, looking at it upon anterior view, it will be found by careful lateral observation that there is a posterior bowing.

EXPENSIVE FINGER

J. K., examined April 5, 1920.

History of Present Condition.—On January 23, 1920, this man caught his little finger of the right hand in a bench lathe, receiving a fracture of the distal joint and laceration of the nail and soft tissues.

Examination.—He now has a perfectly rigid distal joint with a posterior displacement of the proximal end of the distal phalanx, a tight scar over the end of the finger, which is painful to any pressure and makes the distal phalanx entirely useless. This constitutes a total loss of the distal phalanx of the little finger, and it will be necessary to amputate this phalanx in order to give the man a satisfactory working hand, since the scar tissue will break down upon slight traumatisms and the finger will give pain each time it comes in contact with a hard surface. (See Fig. 18.)

Comment.—This hand was injured January 23rd. At this examination there have been seven weeks' compensation paid, at $14 per week. The doctor's bill to date is $60. The man's earnings before the accident were $34.

If this man's finger had been properly amputated in the beginning, when it should have been recognized that no useful member could be made out of the remains, there would have been necessary about three weeks' compensation, $42; the man would have earned during the last four weeks $34 per week; the company would have been saved a second surgical and hospital fee, amounting to approximately $50. The man would have made four weeks' additional pay at $34 a week and the company saved four weeks' compensation at $14 per week, and the specific loss would have been the same. In other words, the poor surgical judgment used cost the company $208, instead of $92, and the man lost $238, instead of $102, if proper surgical measures had originally been instituted.

This is a common occurrence and an expensive one for both employer and employee.

INFRA-ORBITAL NERVE CAUGHT IN CALLUS AND SCAR

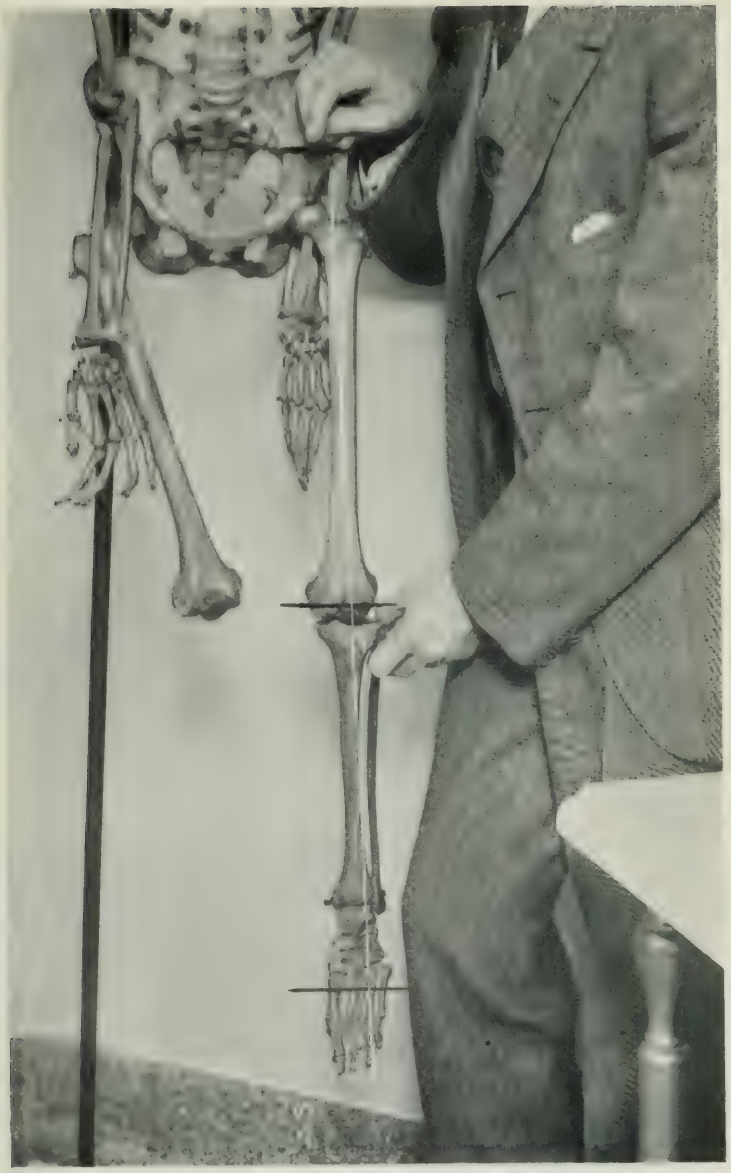
C. M., aged thirty-eight.

History of Present Condition.—On June 2, 1919, this man was struck by a belt hook just below the left eye. He was wearing glasses at the time; the left lens was broken squarely in two perpendicularly, which would indicate that the blow was fairly sharp. He received a depressed fracture of the left malar bone and superior maxilla, involving the lower edge of the orbit and somewhat lowering the general contour of the cheek, which is lower than the average on the right side. His complaint now is that of a tingling in the cheek, and he says when cold air strikes him he has a sharp pain, which runs straight back into the head, up through the left eye and down over the left cheek. This fracture involved the infra-orbital foramen, through which the infra-orbital or superior maxillary nerve reaches the cheek.

Examination (August 26, 1920).—Examination shows an area of anæsthesia, involving the lower eyelid, part of the side of the nose, reflecting onto the cheek, the left side of the upper lid, including the mucous membrane.

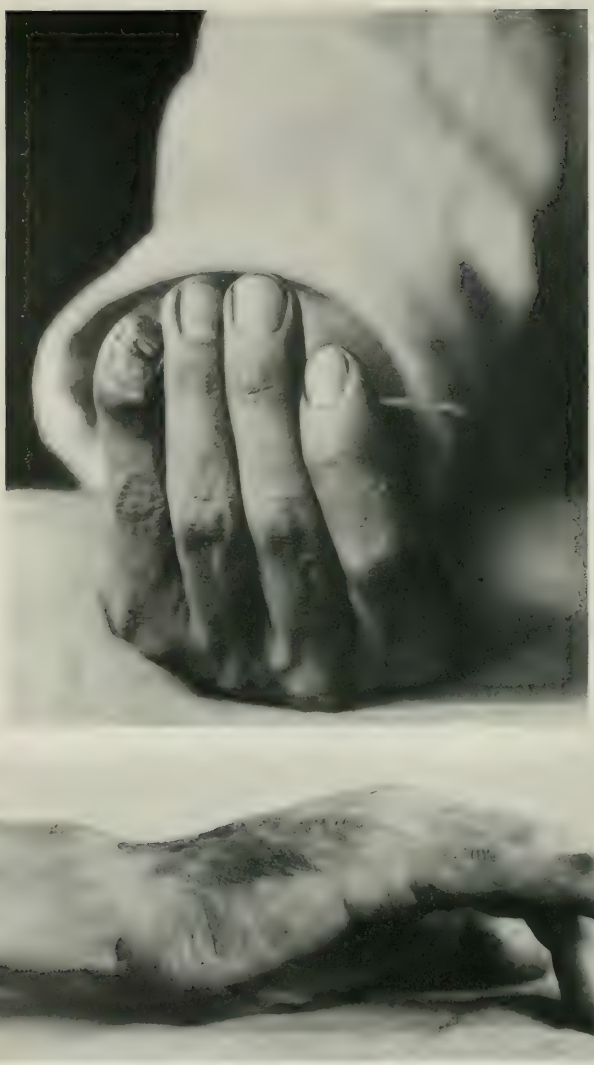
Comments.—The infra-orbital nerve is purely a sensory nerve, which is the terminal of the maxillary branch of the tri-facial nerve. It runs on the floor of the orbit and enters the infra-orbital canal and exits through the infra-orbital foramen to supply the area just described as anæsthetic. It is clearly evidenced here that the terminal branches of this nerve have been cut off from their connection with the Gasserian ganglion. The nerve trunk, however, is involved in the scar and callus caused by the injury, and any irritation of its severed point gives referred pain to its terminal branches, as well as the pain which reflects up into the eye and back into the head. To relieve this condition, it is only necessary to relieve the nerve which is impinged, which can be easily done by chiseling away the callus and evulsing the nerve by slow torsion. It would be impossible to follow this nerve through to any depth, inasmuch as it enters the floor of the orbit, and it might be sufficient to relieve the pressure without evulsion. It is an extremely common occurrence to find the supra-orbital nerve involved in the scars following blows above the eye. This nerve also is purely sensory. The evulsion of this nerve is very easily accomplished by a small incision through the eyebrow and gives entire relief from the pain which is caused by its impingement.

Fig. 17.



Normal weight line, anterior superior spine of ilium—middle of patella—2nd toe or to the outside of it.

Fig. 18.



Expensive finger showing perfectly rigid distal interphalangeal joint with posterior displacement of the proximal end of the distal phalanx and a tight scar over the end of the little finger which is painful to any pressure.

Fig. 19.

Gonorrhœal arthritis X-ray right wrist by Dr. Hollis Potter, showing lack of crispness of the articular margins of all the carpal bones.

Fig. 20.

Pott's disease, X-ray by Dr. Hollis Potter, shows caries involving 7th and 8th dorsal vertebræ, particularly the 8th and concentric about this lesion is a spindle shaped accumulation, a prevertebral abscess.

DIAPHRAGMATIC HERNIA

M. A., aged twenty-nine, coal miner.

History of Present Condition.—On October 24, 1919, while working in a coal mine, this patient was struck in the right upper part of the abdomen by the corner of a car. He was told he was unconscious for about twenty minutes, after which he was taken to the hospital, where his chest was strapped with adhesive plaster on account of three ribs having been broken on the right side. He returned to the hospital on account of this pain and underwent an operation, in which he says the right kidney was sewed back into place.

Examination (November 8, 1920).—He now has a scar of kidney operation on the right side. He was in the hospital from January 26 to March 18, 1920. He says that he was in constant pain during that time, and has had constant pain ever since in the pit of the stomach, radiating over towards the right side. He says that he becomes nauseated, but does not vomit, when his stomach is empty; that he has more severe pain when his stomach is empty than when full. When he stands up with the stomach empty, a distinct gurgle can be heard, even at a distance of two or three feet away, when he inhales or exhales. When this gurgle occurs he has more severe pain than at other times, but it is only present when he stands up and when his stomach is empty. On palpation it is found that his spot of greatest tenderness is just at the costal margin to the left of the median line, and at this point can be felt the greatest vibration from the gurgle, which sounds exactly like gas being forced through a narrow passage. The chest is perfectly normal to percussion and auscultation, with the patient in the reclining posture. The abdomen is tender to pressure in the upper left quadrant, especially about two inches to the left of the median line. Pressure at this point gives pain, radiating towards the right. There was no tenderness at other points in the abdomen.

Upon deep inspiration, with the patient standing, it was believed that a tympanitic note could be heard on percussion above and to the left of the median line, but on account of the patient's inability to hold the breath for any considerable length of time and the comparatively small area over which this tympanitic note could be heard, it is not clear as to whether this was real tympany or the examiner's effort to make it tympany.

The patient in an upright position and behind a fluoroscope, no abnormalities could be seen before barium meal was administered.

The barium could be seen entering the stomach and within the time half a glass entered the stomach the gurgling, which was heard and felt an instant before the barium had entered the stomach, had disappeared and the patient claimed that his pain was partly relieved. The stomach was pressed upon and the patient requested to take a long breath, but no bulging of any portion of the stomach could be demonstrated. The patient was then placed in the horizontal position and asked to take long inspiration in an effort to force the stomach up into any possible opening that might be present in the diaphragm, but nothing could be demonstrated here either.

A series of radiograms were taken immediately after the fluoroscopic examination and a bulging just to the right of the œsophageal opening into the diaphragm was apparent. There is considerable dispute among the readers of these radiograms as to whether this is or is not normal. It, however, corresponds to about the location of the gurgle and the tender point. The tympanitic note in the left thorax could not be demonstrated while the stomach was filled with barium. There were no abnormalities evidenced in the passage of the barium through the alimentary tract.

Laboratory Examination.—The blood and urine examinations were normal and the Wassermann was negative.

Operation was advised for the repair of a rent in the anterior curve of the diaphragm on the left side.

Report of Operative Findings.—This case was operated some weeks following the writing of the above history and examination. An incision was made through the left rectus and careful examination was made of the diaphragm and no tear was found. Upon going over to the median line, however, and palpating the abdominal wall from within outwards, it was found at the upper portion of the recti a split in the fascia could be felt, large enough to insert the ends of two fingers; the stomach was thoroughly examined and no pathology found. The pylorus was patulous. The gall-bladder and ducts were normal. There were no adhesions found. The kidneys were palpated and found to be in place. The right one, which had been injured and subsequently fixed, was more firmly attached to the posterior abdominal wall than the left. The duodenum was also examined, inspected and palpated and found to be normal, and no abdominal adhesions discoverable. It was, therefore, decided that the patient's

symptoms were referable to the split in the fascia and this was repaired by the overlap method and the recti firmly sutured together in the median line. At this writing, three weeks following the operation, patient is up and has had no recurrence of symptoms. The only thing he complains of is the feeling of tenseness in the scar, which can be expected for some little time on account of the shortening of the tissues by the suture line.

Comments.—It is possible that the gurgling which was noticed on deep inspiration when the stomach was empty, heretofore referred to, was due to the hernia of the stomach through the rent in the fascia. It is reasonable to suppose that the examination would have disclosed this rent in the fascia, but no bulging was discernible on the examination and no weakening of the abdominal wall was felt from the outside upon examination. It occurs to the writer that, in the light of what we now know, possibly a thorough palpation of the abdominal wall in minute detail was not properly done. The palpation was made by the ends of the examiner's four fingers held in the usual manner, and a small hernia was not detected. It may also be that in the search for symptoms to corroborate the diagnosis of diaphragmatic hernia, the possibility of a hernia between the heads of the recti was lost sight of, or at least not gone into as fully as should have been done.

WRIST INJURY—GONORRHŒAL ARTHRITIS

W. V. S., aged thirty-eight, laborer.

History.—Three months ago this man claimed that he fell on his right hand while working at a large steel plant. Right wrist swelled and was painful. He saw the company doctor, who diagnosed it as a sprain. He was off work for three days, wrist treated with heat and rest.

He worked for another month for this concern and then went home for a month. During this time his wrist did not pain.

One month ago he returned to work and on the same day reported an accident stating he strained his right wrist on a machine by a sudden turn. It pained considerably, but he continued to work for eight days. He then had an accident to his foot, and was sent to a nearby hospital, where incidentally an X-ray was taken of his wrist, which showed no fractures or dislocations. No other remarks were made on the X-ray findings. Soon after this his wrist started to swell and pain, so he couldn't work. This swelling and pain are worse now. He has not worked for three weeks, and treatment with rest and heat has made it worse.

tenth dorsal vertebræ. This region is extremely painful and tender.

All motions of the spine are limited, and pain is increased by motion. Pain is increased by pressure on the shoulders downward with the patient standing and relieved by lifting under the arms.

The spine is immobilized by the muscles, which are rigid and boardlike. He turns his whole body when he tries to look back of him and cannot flex forward.

There is no paralysis or nerve involvement. No external evidences of injury from the block hitting his shoulder.

General Examination.—Nose, teeth and tonsils are negative. Heart is negative.

Lungs.—Upper right lung above second rib—many moist râles, dulness over this area and bronchial breathing. Apex of left lung; few moist râles.

Previous Medical History.—Has always been healthy, except for childhood diseases. Says that he has had a projection of his spine ever since he can remember, but never had any pain until the accident. He has always been thin and has not lost weight recently. He has always worked in a factory where he is now foreman. The work has not been hard, does not require heavy lifting, but he cannot now do it, as being on his feet causes him great pain. He is married and has two healthy children.

X-ray by Dr. Hollis E. Potter (Figs. 20 and 21). Dorsal spine shows caries, involving seventh and eighth dorsal vertebræ, particularly the eighth. Concentric about this lesion is a spindle-shaped accumulation, which resembles a prevertebral abscess.

The fact that the seventh and eighth vertebræ are not fused and the presence of the prevertebral abscess argue that the tuberculous process is something less than completely healed.

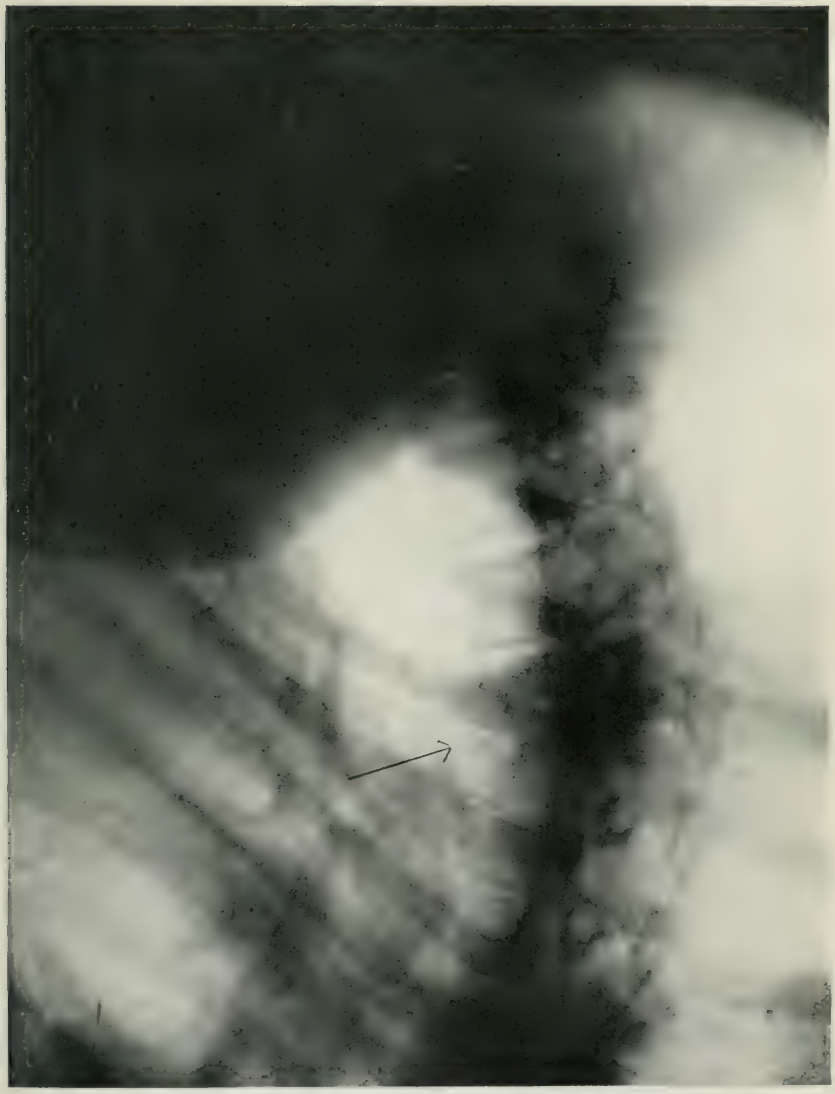
Upper right lung: Considerable amount of consolidation, with probable cavity in the centre.

Diagnosis.—Tuberculosis of the spine (Pott's disease) and chronic pulmonary tuberculosis.

Comments.—Did the injury cause this present condition? No, for, from the history of the presence of this deformity, the condition must have been present for a long time. The plant doctor is also this man's family doctor, and he states that he has had this deformity since he has known him.

Did the injury aggravate this condition? If it did, under most

Fig. 21.



Pott's disease. X-ray by Dr. Hollis Potter, lateral view of, same as Fig. 20, showing caries of bodies of 7th and 8th dorsal vertebræ and the fact that the bodies are not fused.

state laws the man can recover compensation. The blow was on the shoulder and there is now no external evidence of the blow. The man says it did not hit his spine, but he does maintain that he never had pain in his back before and that now he has. This is confirmed by his family doctor.

With the condition of his lungs and of the tuberculous process of his vertebræ, it is doubtful if the injury aggravated it, as both are chronic processes and have existed for a long period, progressively growing worse. But he has had no recorded medical examination, therefore the progress of the condition is unknown.

There is a possibility that the blow of the block on his shoulder caused a sudden flexion of the spine, and that this flexion caused the bodies of the seventh and eighth dorsal vertebræ to break down, and that this caused the old process to become active and painful. With an old process with this amount of deformity and not painful, the X-ray usually shows an ankylosis of the diseased vertebræ. In this case, there is a caries of the bodies of two vertebræ, the vertebræ not fused, and a dorsal abscess indicates a process still active and not healed. This is more than six months after the accident.

The treatment should have been started months ago, but an X-ray was only taken of the shoulder, and the true nature and activity of the spinal tuberculosis was only discovered at this examination. In this case, as the process is active, the man should have rest in bed with extension from the chin and occiput to the head of the bed, to give rest and prevent further deformity.

This case again illustrates the importance to the employer and to the man of a systematic medical examination and survey of the employees of any plant. In this case it would have protected the employer against the claim for a permanent disability for an aggravation of a previously existing disease, for nobody knows the condition of this man before the accident. The employee would have been informed of his pulmonary tuberculosis and of the danger of this and his spinal tuberculosis growing worse—working in a dusty shop. Other outside work could have been given him, also suggestions as regard hygiene and open-air sleeping, and there is a strong possibility that he would not be in his present condition if this had been done. Thus his employer would have been saved many thousands of dollars and the man continued to earn $45 a week instead of fighting a claim to draw $14 a week.

Surgery

TREATMENT OF ANAL FISSURE

By CHARLES J. DRUECK, M.D.
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When the fissure is due to syphilis, polypus or papilloma, treatment is directed to them rather than to the fissure, also constipation or proctitis must be relieved or the ulcer, even though temporarily healed, will return. Opiates and sedatives increase the constipation, thereby increasing the trauma and pain.

Two general principles govern the treatment of fissure:

1. Rest.
2. Drainage.

It is not necessary to operate on every case, for a great many can be cured by palliative methods.

In recent fissures, before the wound edges are thickened or undermined and before pus burrowing has occurred, local dressings give good results.

Laxatives are to be used very guardedly. Salines produce very irritating liquid stools, also resinous cathartics like podophyllin and aloes are objectionable because of their effect on the colon. The old-fashioned remedy of sulphur and cream of tartar or the more modern remedy of phenolphthalein may serve us well in selected cases. Before each defecation the patient should use a small enema of olive oil or glycerine to soften the fecal mass and assist in its easy evacuation.

Following defecation the patient should sit in a hot sitz bath, and take an enema in order that any irritating substances in the fissure may be washed out. The parts should be dried, and some mild dusting powder and a piece of gauze be placed between the buttocks in order that any secretion may be absorbed. A short rest may be necessary following the defecation to relieve the patient from exhaustive suffering, but usually he will be able to attend to business until the next bowel movement.

Before dressing the ulcer it is necessary to prepare the anus that

a proper exposure of the ulcer may be had without causing violent suffering. Such method of preparation has been detailed when discussing the examination of the fissure.

After proper preparation of the anal canal, a conical, fenestrated speculum is carefully inserted with the shutter over the fissure, the shutter is withdrawn and the speculum gradually opened, bringing the fissure well into view, when it is carefully painted with 10 per cent. silver nitrate solution, or if sluggish granulations are present, pure ichthyol is better. It is often well to alternate with applications of Balsam of Peru 20 per cent. in castor oil.

Sometimes this occasions a spasm of the sphincter for a time after the treatment, but this may be avoided by smearing the field promptly with

Ung. Strammonii.
Ung. Belladonnæ.
Ung. Hydrastal....a. a.

A cure should be accomplished by this course in two to four weeks and sometimes with only a few treatments. If not obtained within this time the fissure should be treated surgically. When the sphincters are hypertrophied and spasmodically contracted, or the ulcer is deep with indurated and undermined edges, or the sentinel pile has developed, or the muscle wall is exposed, local measures as outlined above are not sufficient.

Surgical Treatment.—Divulsion of the sphincter muscles is one of the older methods that is still heard of occasionally. Although it does relieve and often cures fissures, it requires a general anæsthetic, produces undue traumatism of the mucosa, sometimes leaves a permanent injury to the sphincter whereby the patient loses the sense of approach of gas or liquid material, and may lose full control of ordinary fecal matter, and sometimes leaves a permanent neuralgia of the anus. It frequently does not afford permanent relief, particularly in fissure in the posterior median commissure, and is passed as not being good surgery of to-day.

Incision with drainage produces much better results, and unless the sphincter is particularly irritable or the patient very nervous or hysterical the operation can be performed under a local anæsthetic.

Technic.—The peri-anal skin and the sphincter muscle must be

carefully and completely anæsthetized. One-half of one per cent. apothesine may be used for the cutaneous infiltration. The patient is placed in the proctologic or the exaggerated lithotomy position as best suits the condition, the skin in the posterior raphe one inch back from the anus, where it is less sensitive, is touched with phenol on a swab, and after waiting a few minutes the skin is picked up between the thumb and forefinger of the left hand and the needle introduced at the cauterized spot (Fig. 1). A few drops of the apothesine solution injected here causes a wheal to arise, and after waiting a few moments the needle is advanced and another wheal made while the needle is carried forward just under the skin at a distance of one-half inch from the anal opening. When the needle has been advanced its full length on one side it is retracted to the posterior commissure, but not withdrawn from the skin and the infiltration carried up on the other side of the anus. When the full depth of the needle has been reached on both sides of the anus it is withdrawn and inserted at the most anterior wheal just made and the infiltration continued to the anterior commissure and around on the opposite side until the wheals meet those previously produced. In this way the whole anal opening is anæsthetized while the needle is always kept one-half inch out from the edge of the mucous membrane. This procedure blocks the inferior sphincter nerves. When the cutaneous infiltration reaches the anal fissure the needle is carried down beneath the base of the ulcer and its surroundings, including the sentinel pile, are well filled. It is sometimes necessary at this time to place a cotton pledget wet with 2 per cent. apothesine into the fissure. Wait ten minutes for anæsthesia to be complete and then carefully introduce the left index finger into the rectum above the external sphincter, hook the finger over the muscle and by slight traction draw it down and steady it while a long needle (at least 2.5 inches long) is passed through the skin at the anæsthetized bullæ into the sphincter muscles and 10 minims of 0.5 per cent. quinine and urea solution is deposited in the substance of the muscle. This deep injection is made on either side of the region of the fissure and in one or two distant parts of the sphincter. After waiting 10 minutes to insure complete analgesia the fissure is dissected out in such a way that a V-shaped wound results, which is twice as deep at the lower skin end as at the upper extremity within the anal canal. The base of the fissure is removed

Fig. 1.

Method of producing local anæsthesia of anus. Dotted lines show arc of superficially anæsthetized area. Black dots indicate points of entrance of needle for deep anæsthesia about the fissure.

deep enough to expose the muscle wall and the outer end of the wound extends well out onto the skin to facilitate drainage.

The sentinel pile, if present, is carefully included in the parts cut away, and also any papilla or small polypoid growth at the upper end of the fissure, which might fall into the rent and hold the wound apart. Sinuses burrowing under the mucous membrane are sought with a probe and when they are found should be widely opened.

The whole wound is now well anointed with heavy vaseline, and the wound packed with paraffined gauze laid in narrow layers. A light anal dressing with adhesive strips concludes the dressings.

In 24 hours the gauze packing is removed and its removal is painless, quite a contrast to a dry gauze packing, which becomes filled with granulations and blood clots. As the gauze is removed the wound is flushed well with saline solution or sterile water and these flushings are repeated once each day and also following each bowel movement, until the field is completely healed, which requires about three weeks. During these dressings the edges must be carefully separated by the attendant pulling the buttock apart. The whole wound is exposed and regeneration develops from its base. Particular attention must be given the upper limit of the wound and also the lower outlet that perfect drainage may be provided.

It is advisable, although not necessary, that the patient keep his bed for a day or two after the operation. The evacuations should be kept free and the movements soft, and after each defecation the patient should take a warm antiseptic sitz bath. There is at times temporary incontinence following this operation, but this disappears as the wound heals. When the fissure has existed continuously for several months, or when it has been operated upon and has not healed promptly, the possibility of syphilis will call for a blood examination, and also tuberculous, anæmic or rheumatic factors must not be overlooked.

Irritable ulcer at the anus but associated with catarrhal inflammation within the rectum is obviously not amenable to operation, but demands treatment of the underlying cause. Local irrigations of 20 per cent. solution of krameria will give much relief in these cases by relieving the irritating mucous discharge.

WOUNDS OF THE VESSELS OF THE FACE, NECK, AND LIMBS. THEIR SURGICAL TREATMENT, BASED UPON FOUR HUNDRED AND FORTY-THREE CASES

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(*With illustrations, after the drawings of Drs. Rolland and Portes, by A. Mittendorff.*)

Out of a total of 8000 wounded men who passed through my hands in an active ambulance service during the war, 443 of them presented wounds of the blood-vessels, all treated in the same surgical service. These cases were all injuries to the vessels of the neck, face and limbs and do not comprise those of the vessels of the thorax or abdomen, which I shall not refer to, as this is a special branch of vascular surgery. Large incisions and free exposure of the vessel injured, operating in healthy tissues, as was the practice followed by Proust, Sencert, Duval, Fiolle and Delmas, is the technic I followed, and forms the basis of this paper. My friends, Doctors Rolland and Portes, assisted me in my anatomical researches, and to them I am indebted for the drawings made from nature which illustrate this paper.

Wounds of the vessels are usually due to bits of exploding shell, but in active offensive fighting wounds from shrapnel shot are frequent. Exceptionally, I have met with vascular wounds due to knives or bone splinter. These traumatic agents are the cause of primary or secondary hemorrhage. This may be due to a contusion of the vessel with elimination of the eschar a few days later or result from a pressure wound, in which at each systolic beat the vessel wears out its wall against a foreign body, in which case we have late opening of the artery, described by Grégoire.

PATHOLOGICAL ANATOMY

The 443 wounds of the blood-vessels observed may be best divided into regions, as follows:

Vessels of the face	8 cases	Total = 22 cases.
Superficial vessels of the neck	6 cases	
Deep vessels of the neck	8 cases	
Axillary vessels	10 cases	Vessels of upper limb; total = 185 cases.
Superficial humeral vessels	71 cases	
Deep humeral vessels	14 cases	
Radial vessels	47 cases	
Ulnar vessels	43 cases	
Gluteal vessels	20 cases	Vessels of lower limb; total = 236 cases.
Superficial femoral vessels	39 cases	
Deep femoral vessels	9 cases	
Popliteal vessels	31 cases	
Tibio-peroneal trunks	10 cases	
Anterior tibials	42 cases	
Posterior tibials	68 cases	
Peroneal vessels	17 cases	

Of these 443 cases there were 314 cases of injury to both artery and vein, or 70 per cent.; injury to artery only, 13 per cent.; injury to the vein only, 17 per cent. In other words, 30 per cent. were injuries to either an artery or vein.

Nevertheless, in the upper limb the axillary vessels were involved in 60 per cent.; in the lower limb the superficial and deep femorals and popliteals were the seat of the lesion in 50 per cent. of the cases, while injury to the posterior tibials represented 40 per cent. of the cases.

The Aspect of the Vascular Lesion.—This varies greatly from one case to another. One of the rarest, but likewise one of the most curious, is *arterial stupor*. One instance of this condition was observed in my series. The case was a seton wound from the axilla to the neck from a bit of exploding shell and therefore had passed through the supraclavicular area. The entrance aperture was a little to the left of the median line at the level of the spinous apophysis of the fourth cervical vertebra. The exit aperture was at the level of the anterior wall of the left axilla, a little below the lower border of the pectoralis major. Doctor Viannay was certain that there was an injury to the axillary artery and, after consultation with Doctor Proust, decided to cut directly down on the lesion without previously ligating the vessel. An incision was made parallel to the inferior border of the pectoralis major, passing through the exit aperture and extending on to the arm. Division of the pectoralis major under

which an infiltrated hæmatoma was discovered. In order to have a larger exposure a second incision vertical to the first was made and thus the pectoralis major could be divided down to the clavicle and afterwards the pectoralis minor.

These muscles were raised with the flap and an hæmatic infiltration was then found extending to the apex of the axilla. The distended axillary vein presented a lateral protuberance which felt indurated to the finger and led to the suspicion of a thrombosis. The axillary artery was exposed at the angle of the two branches of the median nerve and was then denuded by progressive upward dissection in search for a lesion of this vessel until the clavicle was reached. The result was negative.

A lesion of the subclavican above the clavicle was then thought of and after dividing this bone the axillary vein was seen to collapse and presented oscillations synchronous with the respiratory movements. The subclavian artery did not pulsate. In order to have more room, five centimetres of the clavicle were excised and exploration of the subclavian was continued by both sight and touch down to the first rib. There was not a trace of hæmatic infiltration in the subclavian space. Then the subclavian artery began to pulsate weakly synchronously with the beats of the radial on the opposite side, but no pulsation could be felt in the radial of the same side.

The arterial tunics appeared to be absolutely healthy and the operation was completed by suture of the pectoral muscles and skin with drainage of the axilla. A few hours later pulsations of the corresponding radial became perceptible and the pulse progressively assumed the same characters as on the opposite side. The recovery was uneventful.

This arterial stupor may be compared with lesions described under the term of contusion of the arteries. *Contusion of the arteries* may be due to a direct shock or more frequently is the result of an elongation resulting from traction on the vessel. It is classic, since the experiments made at the school of the Val-de-Grace, to distinguish three degrees of lesions. The first degree is represented by fine transversal abrasions as if produced by the point of a pin (Delorme) and are only to be found on the intima. In the second degree these abrasions are more marked and involve the tunica media. In the third degree the intima and tunica media are torn through over the entire circum-

ference of the vessel. They retract into the sheath formed by the adventitia, so that when inspected from without the vessel presents a kind of strangulation (Sencert).

These lesions produce the formation of a thrombus, which is long in forming when the contusion is of the first or second degree and only makes itself tardily known by the occurrence of arterial emboli. When the contusion is of the third degree the occluding clot rapidly forms and has a tendency to extend upwards especially and to occlude the collaterals. It consequently cuts off the primary circulation and prevents collateral circulation from taking place. Ischemic gangrene of the limb results if early operation is not resorted to. An operation will likewise prevent secondary hemorrhage which follows the elimination of the eschar, which slowly forms in the vessel walls.

During operation arterial contusion may be suspected when the vessel does not pulsate, when it presents a strangulation or an increase in calibre, when its walls are ecchymotic and palpation reveals its occlusion by a clot.

A type of lesion intermediary to contusion and lateral wounds of the vessels is the one in which small metallic bits are found stuck into the walls of the vessel without having completely perforated them. In a more advanced degree the foreign body will have perforated the walls and forms a plug, and this is, in reality, a variety of lateral wound, but more frequently the traumatic agent is only in contact with the vessel.

I have had 33 cases of *lateral wounds of the arteries* in my series and ten of the veins. They are especially encountered in the large axillary, humeral, femoral and popliteal vessels.

Lateral wounds of the arteries are by far the most interesting. Whenever the three tunics are involved the variation in the aspect of the lesion is very considerable from one case to another. Aside from linear wounds, which are uncommon, a rounded aperture will most frequently be found as if punched out, but these, however, are less frequently than lateral wounds with irregular tears and inverted fragments of the arterial coats which are invariably insufficient for assuring spontaneous hæmostasis. This is because to the loss of substance, often very minute, retractility of the middle tunic becomes added, with the result that the edges of the wound are spread apart

or even bending the vessel (Sencert) so that the lateral tear is made to gape open.

Lateral wounds are those prone to bleed the most, and if the soft structures are considerably traumatized, and if the artery is almost denuded, external hemorrhage occurs which may threaten the patient's life. Or if, on the contrary, the soft parts are not much involved a jet of blood will be seen coming through them at each cardiac systole, which progressively infiltrates the tissues and vascular sheaths, forces itself into the muscular interstices and under the aponeuroses which cover the vessel and to which it imparts a bluish-black color. *A diffuse arterial hæmatoma* is thus constituted.

Vascular lesions produced by through and through perforation of the vessel by a bullet, more rarely by a bit of shell, are usually more important than lateral lesions, because they invariably require ligature.

The large trunks are ordinarily involved for obvious reasons. My friend Duter had an interesting case. It was a bullet wound in the lower part of the thigh with a lateral wound of the popliteal vein and a through and through perforation of the popliteal artery. A quadruple arterial and venous ligature was done, recovery was uneventful and the results excellent.

But all these lesions—perforation, lateral wounds—are rare, generally speaking. *Transversal* wounds involving two-thirds or three-fourths of the vessel's circumference, and especially *total rupture,* are what are generally met with. In cases of total rupture or division the section may be clean-cut if it has been produced by a bullet, but more often, and especially when the traumatic agent is a bit of shell, the ends of the divided vessel are ragged and more or less inverted.

Now, what happens when a vessel is divided? There will be either (*a*) an external hemorrhage, (*b*) an abundant or medium blood collection, namely, a diffuse hæmatoma, and (*c*) a small blood collection or even none at all.

(*a*) *External Hemorrhage.*—In order that this shall take place a gapping wound is usually necessary or there must be parallelism between the edges of the wound in the vessel and those of the wound in the aponeurosis and skin. The external hemorrhage may be from an artery, in which case the jet is spouty and bright red. When it comes from a vein the flow is continuous and the blood dark in color.

The hemorrhage may come from both an artery and vein, and death frequently takes place, but the patient may be saved by the syncope which favors hæmostasis.

(*b*) *Diffuse Hæmatoma.*—The blood collects in the vascular sheath, cellular tissue and intermuscular spaces. Thus a diffuse arterial hæmatoma is constituted, which may be deep or communicate by a tear in the aponeurosis of the limbs with a superficial hæmatoma, thus forming the so-called *collar-button hæmatoma.*

An important diffuse *venous* hæmatoma may likewise form, especially when a tourniquet has been applied, but not sufficiently tightly, of arresting arterial circulation but sufficient for preventing the return of the venous blood, which thus slowly collects in the intermuscular spaces.

A diffuse hæmatoma may develop rapidly or slowly. It is invariably a serious condition, because it compresses the collaterals and consequently favors ischemic gangrene of the limb. In point of fact, it is in cases of hæmatoma tardily operated on that ligature of an artery is most often followed by sloughing of the limb.

Vascular wounds with hæmatoma frequently become complicated with gas gangrene and they may also be the starting-point of diffuse phlegmon or give rise to secondary hemorrhage a few days after the receipt of the lesion.

However, occasionally the evolution of the lesion remains aseptic and this is what happens in certain favorable cases of bullet wounds and the diffuse arterial hæmatoma may become transformed into an *encysted arterial hæmatoma,* which is described by Sencert as follows:

"Little by little, in contact with the surrounding tissues, the blood coagulates at the periphery of the collection. The coagulated blood retracts, the irregular prolongations of the collection become reduced, the *ensemble* assumes a regular, even shape as the hæmatoma becomes stabilized. The irritation produced by the clot on the surrounding tissue has, as a consequence, a serous and leucocytic infiltration which first gives rise to a kind of peripheral œdematous wall, then to a true hard sclerous shell which, by progressive organization, slowly becomes individualized as the hæmatoma grows older. At the same time, the clots deposit white stratafications on the internal surface of the plious shell and thus the commencement of walls which

have been the cause of erroneously regarding the hæmatoma as a true aneurism. In reality, the lesion is by no means an aneurismal wall that can be dissected out and excised. Up to the fifth week at least this reactional shell can be removed by gauze sponges, so that aneurism must not be spoken of but only encysted arterial hæmatoma."

I would add, however, that an encysted arterial hæmatoma will undergo an evolution towards an arterial aneurism with a hard connective-tissue shell with a vascular endothelial lining, but this lesion is only met with in cases of long standing and which have been left untreated.

(*c*) *Small Blood Collections or None at All.*—These cases may be conveniently divided under three headings: (1) The first consists of the cases of venous injury coexisting with an arterial wound; (2) this second heading comprises all cases of dry vascular wounds, and (3) lateral wounds of the vessels with a foreign body lodged in the walls and acting like a plug.

When a venous wound coexists with a wound of an artery the following eventualities may occur: (1) A union between the opening in the artery and that in the vein, hence formation of an *aneurismal varix* and *no* hæmatoma or compression of the collateral vessels; therefore, dry gangrene of the limb will not develop. (2) There is no union between the two vascular openings, but the hæmatoma is not extensive because the blood is attracted by the central end of the vein; therefore, there is no compression on the collaterals and little chance of gangrene. (3) An arterioso-venous aneurism develops. There has been a short phase of diffuse hæmatoma to which an encysted hæmatoma rapidly follows, whose centre forms a true canal, allowing communication between artery and vein. The hæmatoma retracts and both vessels become united by a small fibrous canal. In other cases a true sac exists between the artery and vein, whose walls become so perfectly individualized that the sac can be completely excised.

Dry Wounds of the Vessels (Fiolle).—Dry wounds of the vessels are more commonly met with in cases of complete division of an artery. There is elongation and rupture of the internal tunics *above* the lesion and their inversion into the lumen of the vessel with an occluding clot formation. Both ends of the artery pulsate in the wound like a ligated artery in an amputation stump.

Besides these dry wounds with total rupture, there are other dry wounds in cases of lateral wounds of the vessels, although these are far less frequent. A small tangential wound will be perceived. The artery bleeds into its adventitia and a clot is formed which assures hæmostasis.

Lateral wounds of the vessels with a foreign body acting as a plug give rise to little loss of blood, but when the body falls from the opening in the vessel a *retarded hemorrhage* then takes place.

Concomitant muscular lesions are especially important in the posterior aspect of the leg, buttocks, thigh and dorsal region—in wounds of the axilla—and require careful surgical treatment. Gas gangrene is very prone to develop in these regions and with greater facility when there is considerable destruction of muscle, to which are added hæmatoma and deficient circulation, conditions particularly favorable for the development of gas gangrene.

Concomitant bone lesions are common. In the case of the face they are fractured in 100 per cent. of the cases, 76 times in 185 cases in the upper, and 101 times in 236 cases in the lower limb; in other words, in about 40 per cent. in the upper and lower limbs. This percentage is increased in order of frequency to two-thirds of the cases of wounds of the deep humeral vessels, the vessels of the forearm and leg representing a little over 50 per cent.

Concomitant nerve lesions are met more frequently in the upper limb, represented by one-third of the cases in wounds of the deep humeral vessels and in about 20 per cent. of cases of wounds of the superficial humeral and ulnar vessels.

SYMPTOMS AND DIAGNOSIS

I will not deal with the symptomatology of accidents following vascular wounds, as this paper merely refers to cases as met with in ambulance practice at the front, so that only one question comes up for consideration, namely, has a vessel been injured? I will briefly point out what symptoms indicate a vascular lesion, but before reviewing them I desire to give the following rule that I shall apply in every circumstance, namely, *if the track of a missile appears to traverse a vascular region, the vessels must be exposed in order to verify their condition.*

The track of a projectile is always easy to approximately determine whether it is a seton wound or one without an exit aperture. In the first case entrance and exit apertures will indicate whether or not the missile has passed through the axis of the vessels of the region, while in the latter case the entrance aperture and radioscopic localization of the missile will give the same data. The above rule suffers no exception, even should the vascular symptomatology remain silent—a condition that is met with in certain instances of arterial stupor and contusion and dry wounds in which the circulation in the limb appears to be carried out normally and the pulse below the lesion is quite as perceptible as that in the opposite limb. However, in the majority of cases wounds of the vessels give rise to numerous symptoms.

PHYSICAL SIGNS

Increase in size of the limb or deformity are due to œdema and the subjacent hæmatoma. The normal depressions are filled and where these should exist there is an elevation above the surrounding surface.

Changes in Color of the Integuments.—The skin is white and dull in the parts adjacent to arterial or venous rupture or ecchymoses extending some distance from the lesion may be present. Thus in a case of wound of the humeral high up the ecchymosis extended downwards as far as the lower part of the external aspect of the forearm.

External hemorrhage when the blood is bright red and appears in jets indicates rupture or division of an artery; when dark and continuous in flow, a venous lesion is present.

Systolic expansion and pulsation are both present in arterial hæmatoma and when the vascular tumor is inspected with the light coming from behind the observer it will be seen to rise with each systole.

PALPATION

Changes in the Consistency of the Tissues.—These consist of hardness and a peculiar feeling of resistance due to a hæmatoma.

Changes in the Pulse.—The pulse is usually wanting or at least diminished in arterial ruptures, but I have pointed out that abnormally it may not reveal any change.

Thrill.—This is met with in arterio-venous aneurisms, but I have personally seen few cases of this type.

Changes of the Temperature.—The local temperature is lowered below the site of the lesion in some cases of rupture of an artery, but in patients coming under observation some time after the receipt of the injury it may be raised, indicating phlebitic accidents.

AUSCULTATION

Auscultation of a vascular tumor when this is an arterial hæmatoma will reveal a systolic murmur synchronous with the arterial pulse. It is due to the passage of the blood at each systole through the arterial wound giving rise to vibration of the ruptured edges.

FUNCTIONAL SIGNS

Disturbances of Sensibility.—Pain is due to lesions of the nerve filaments that have been divided or contused by the missile, as well as from their compression by a hæmatoma.

Numbness of the limb results from poor circulation which attains its maximum in certain cases of rupture of large vessels.

Functional impotency is particularly marked in lesions of the axillary and femoral arteries, to such an extent that the patient cannot raise the arm or stand.

GENERAL SIGNS

These exist when the external hemorrhage has been severe and consist of palor, pale mucosæ, cold limbs and tongue and, most important of all, the tip of the nose. There is vertigo with a tendency to syncope, tinnitus aurium and ocular disturbances—flashes before the eyes.

TREATMENT

There are some cases of wounds of the vessels at the root of the limbs which, from the onset, are beyond any treatment, and the patient dies from external hemorrhage, either on the battlefield or while being transported to the dressing-station. But fortunately this is the exception and usually things take place in the following order: The patient is brought in with a wound of a vessel which does not bleed or there is external hemorrhage. In the first case a simple dressing is applied; in the second, a tourniquet. Enough cannot be said about the judicious application of the tourniquet; it should only be applied

in cases where it is absolutely necessary and then it should attain its aim, namely, to stop the arterial circulation.

Now, very frequently *a simple compressive dressing is sufficient,* because the hemorrhage is simply venous, while in other cases, also frequent, the tourniquet is applied in such a way that it compresses the vein without compressing the artery, therefore favoring a hemorrhage that its object was to stop. The band should always be applied over the dressings so that it will not escape notice when the patient reaches the ambulance, and he should be at once admitted to the operating-room as soon as he is brought to a surgical formation.

In cases of wounds of the roots of the limbs and base of the neck, a very good practice, advised by Sencert, is to close the cutaneous wound by a Kocher's hæmostat which is left *in situ* until operation. When the patient leaves the dressing-station for the surgical ambulance, he will belong to one of the two following categories:

(1) There may not have been any external hemorrhage at the time he was seen at the dressing-station; therefore, a simple dressing has been applied. Now, during transportation, hemorrhage occurs and he dies, or he reaches the ambulance in a state of acute anæmia. The clot which made hæmostasis has become mobile from motion during transportation.

(2) The patient has a very tightly applied tourniquet on the root of the limb, so that every minute counts; otherwise, the life of the member will be forever compromised.

When the patient reaches the surgical ambulance he should be examined at once. The blood-pressure is taken. If the maximum pressure is below 6 and there is no external hemorrhage, he should at first be thoroughly warmed and given a saline injection of 250 c.c. and a hypodermic of 4 c.c. camphorated oil. The blood-pressure is taken one hour later, and if it has gone up operation may be undertaken. In some exceptional cases of acute anæmia blood transfusion by Jeanbrau's technic is to be done. But usually it is enough to prepare the patient for operation at once. For a wound of the neck or face, the entire scalp and face should be shaven. In wounds of the limbs, the parts should be shaven above and below the site of the wound to the extent of at least eighteen inches in order to make a long incision.

The search of the vessels will be discussed separately for each

vessel. Having discovered the lesion a provisional ligature is passed under the vessel at the upper angle of the incision. If the vessel involved is a large one, like the femoral or axillary, a small elastic clamp had better be used than the ligature.

The treatment will vary, according to the lesion. In cases *of arterial contusion, total rupture, a large transversal wound with ragged edges and contused for some distance, a perforation or a lateral wound with loss of substance, the treatment in all these is ligature of the vessel in healthy tissue above and below the lesion, with excision of the injured portion of the vessel comprised between the ligatures.*

Such an operation is easy to carry out in cases of contusion and dry vascular wound, but difficulties arise when a diffuse hæmatoma hides the vascular bundle and when blood surges up from the bottom of the wound. In these circumstances the hæmatoma must be opened throughout its entire extent, compress the vessels over the bleeding point, draw on the temporary ligature or, still better, apply clamps in its place in order to secure hæmostasis above and below the lesion. The clots are next carefully turned out which are a cause of compression and secondary infection. The permanent ligature must be made in healthy tissue; that is to say, the wall of the vessel at the point at which the ligature is applied must be healthy in its entire thickness.

Let me recall that in arterial contusion the lesions of the endothelium extend far up above the lesion, so that if the ligature is tied too low down the blood-clot which has formed may not be entirely below the ligature so that it will continue to increase after the operation, occluding the collateral artery the nearest to hand and hence interfere with the establishment of the collateral circulation. For this reason it has been very properly advised to place the ligature as high as possible on the proximal end of the artery, *exactly below* the first collateral vessel.

If the wound of the artery is transversal or lateral with clean-cut edges and no loss of substance circular or lateral suture of the vessel may be attempted, but only in the case of dangerous arteries, such as the axillary—between the circumflex and deep brachial—the femoral at the base of Scarpa's triangle and the popliteal in its lower half—the tibio-peritoneal trunk. But suture must never be undertaken unless the operative conditions are perfect and the necessary

instruments and suture material are at hand. And, above all, the wound must be rendered absolutely aseptic. Therefore, I think that a temporary hæmostasis must be first secured by the application of blood-vessel clamps above and below the wound in the vessel. Then, with one set of instruments, a careful myectomy is done and all doubtful tissue excised. A second set of instruments is then taken as well as a change of gloves, and the wound in the artery is next attended to.

The wound is walled off with gauze, so that only the artery is exposed to view. The vessel is cleaned off with fine scissors and when perfectly exposed the wound in the walls is sutured, according to the well-known procedures. Care must be taken to prevent the suture from coming in contact with blood, as this may compromise the result by facilitating thrombosis. It may happen that the circulation becomes slowly reëstablished during the days following the interference, that the segment of the artery sutured will not allow the blood to pass through, but the operation will not have been useless if it has given the time for collateral circulation to develop.

Before concluding the treatment of primary wounds of the vessels a word must be said about vascular grafts. This should only be done in the case of the *dangerous arteries* when the loss of substance is important. A segment of the neighboring vein is used for the graft, and all the operative conditions must be present as in the case of arterial suture.

Perhaps when the vein is not injured as well as the artery, it might be advantageous to make a double arterio-venous anastomosis by the following technic: The artery is ligated above and below the lesion and the segment of the vessel between the ligatures is excised. A double ligature of the vein is made two and a half centimetres above and below the respective ligatures on the artery. Then a double latero-lateral arterio-venous anastomosis is made at the two arterial ends. Thus the blood passes from the artery into the vein and then into the distal end of the artery.

However, conditions in a surgical ambulance at the front are not usually such that either suture or graft can be done, and one must be content with ordinary ligation, and it then becomes a question whether or not the corresponding vein should also be ligated even when not injured (Makins). I have the impression that ligature of

the vein is not detrimental, but I can not affirm that it is advantageous. It is, however, logical and, I believe, preferable to do.

The treatment of the vascular wound should invariably be completed by that of the muscles, bones and nerves of the region, while the immediate post-operative treatment is of very great importance in patients who have lost much blood before or during operation, or in those who develop shock. All patients belonging to this category should be very attentively watched, the foot of the bed raised and the body surrounded by hot-water bottles or electric heaters. Intravenous or hypodermic salines and camphorated oil are to be given, but if this medication appears insufficient blood transfusion should be done without delay.

Secondary hemorrhage is a thing of the past and should never be met with to-day if care be taken to verify the state of the vessels in every case in which a missile appears to have involved a vascular region, and if the ligatures are placed on healthy tissue and treatment of other lesions—bones and muscles—has been correctly carried out.

When a secondary hemorrhage does arise the general technic above outlined should be followed, that is to say, to freely open up the wound, search for the vessels and ligate above and below the lesion and excise the segment between. The difficulties are greater than in fresh wounds, because the tissues are hard and inflamed, adhesions are considerable between the elements composing the vascular bundle and the bundle itself to the adjacent structures. Occasionally a secondary hemorrhage in a weak patient in an infected midst will render amputation necessary.

WOUNDS OF THE VESSELS OF THE FACE

I have observed eight cases of vascular wounds of the face; five were wounds of the facial artery always with fracture of the lower jaw; twice with injury of the facial bone block with compound fracture of the maxillary sinus with very severe hemorrhage requiring ligation of the external carotid and once a wound of the lingual artery with fracture of the lower jaw. Therefore, it will be seen that in every case of important injury of an artery of the face there was at the same time a bone lesion.

The vascular lesion is easily dealt with by ligature of the vessel when this is the facial or lingual artery, but if a severe hemorrhage

comes from the maxillary sinus ligature of the external carotid must be done. In this case I believe that it is good practice to ligate this vessel, according to Morestin's procedure, under the posterior belly of the digastric muscle, as it gives a rapid and sure exposure of this vessel. As both it and its branches can be seen, when necessary the ligature of the external carotid can be completed by ligature of the lingual or facial arteries, thus avoiding a too rapid development of the collateral circulation.

WOUNDS OF THE VESSELS OF THE NECK

Superficial Wounds; External Jugular Vein.—I have observed six cases; twice the wound was in the upper third of the vessel in the parotid region and in one there was fracture of the lower jaw. Twice the wound was in the middle third of the vessel in the mastoid region, the muscle having been injured in both cases. In two the wound was in the lower third of the vein in the supraclavicular region at the point at which it disappears under the clavicular insertion of the sterno-mastoid muscle.

These wounds are usually of little importance and are easily treated, but this cannot be said of the *deep vessels* of the neck, eight cases having been under my care. In one an aneurismal hæmatoma of the carotid artery and in two cases there was secondary hemorrhage, in one due to a primary wound of the internal jugular vein. There was one case of wound of the internal jugular in the upper carotid region and one of a wound of the gulf of the internal jugular; also one case each of a wound of the vertebral vein, brachiocephalic artery and one of wound of the brachiocephalic and subclavian veins.

I have observed three instances of wounds of the carotid artery. One was an aneurismal hæmatoma of the left carotid three centimetres above the beginning of the arch of the aorta. There was an important lateral tear of the vessels involving two-thirds of its circumference and in length was one and a half centimetres. The artery was ligated above and below the lesion, but the patient bled freely during the operation and died three days later.

There were two cases of secondary hemorrhage from the carotid. In one case it arose three days after a first operation, which consisted of a simple rapid exposure of the two wounds in the subclavian region with removal of two missiles. The patient had multiple wounds and

was in a state of shock. At the second operation ulceration of the right primary carotid was found and the vessel was ligated above and below the lesion.

In the second case the secondary hemorrhage occurred fifteen days after the first operation in which a lesion of the internal jugular had been found and a double ligature applied.

I am unable to say what became of the first patient, but the second case recovered nicely, and if the outcome is compared with that of the case of aneurismal hæmatoma above reported, the difference can be explained by the following facts: The loss of blood was much less in the case of secondary hemorrhage because the lesions were less extensive and then the treatment was relatively easier, because the lesion was seated about three fingers' breadth above the clavicle, while in the aneurismal hæmatoma it was very low down—lower than was suspected—so that excision of the clavicle was done too late after the vascular sheaths had already been opened. The ligature was done under bad conditions; the wound gave issue to much blood and temporary hæmostasis was difficult to obtain. Hence the enormous importance of radioscopy, which will indicate the probable level of the vascular lesion, so that excision of the clavicle can be done at once *before the aponeurosis of the neck have been incised.* These aponeuroses bridle the vessels, so to speak, and are a means of temporary hæmostasis, because the blood accumulating behind favors compression of the vessels. Hence they should not be directly opened for exposure of the vascular lesion.

Wounds of the Internal Jugular Vein.—In one of my cases there was a wound of this vessel in the right upper carotid region, as well as a wound of the external jugular and facial artery at its origin. Ligation of the three vessels was followed by an uneventful recovery. In a second case the patient was brought in expectorating a large amount of black blood. There was a wound in the left carotid region situated two fingers' breadth above the clavicle. The precarotid depression was elevated. An incision was made along the anterior border of the sternomastoid muscle, exposing a small hæmatoma, but the carotid and internal jugular were found intact. The hemorrhage, which continued to be free, was due to a lesion of the internal jugular on the *opposite* side. The missile entered the supraclavicular region on the left, passed through the pharynx and became lodged in right

posterior infraparotid space not far from the base of the skull and before the right side could be operated on the patient died.

This is an example of one of those complex vascular lesions of the neck which frequently offer great difficulties in diagnosis as well as at operation. In such cases a good radioscopic localization is very desirable, but in the case under consideration the condition of the patient was such that there was no possibility of making this examination. Examination of the pharynx revealed blood on the posterior wall, but did not indicate from which side the blood came. Alone, the site of the entrance of the projectile and a slight elevation of the left precarotid region seemed to indicate a lesion of the internal jugular on this side.

These are unquestionably desperate cases, but less serious ones are encountered. Such lesions may not result in such a marked acute anæmia as less blood has been lost, so that an exact radioscopy can be made of the carotid vascular bundle on the side of the entrance aperture. This done, the upper carotid region on the opposite side should be explored according to the technic described by Fiolle and Delmas, namely, the carotid and internal jugular in the posterior infraparotid space.

Finding that the internal jugular is alone involved, an attempt should be made to place a hæmostat on the proximal side of the lesion and if this is difficult the wound is thoroughly plugged with gauze, after which the posterior-superior quadrant is trephined in order to expose the lateral sinus, which is then compressed with a gauze sponge. Next, the operator returns to the posterior infraparotid space and a ligature is applied on the distal side of the wound of the jugular. It may then happen, since the blood is controlled, that a ligature can also be applied at the proximal side of the wound in the vessel.

To these cases of wounds of the internal jugular I would add another already referred to when speaking of wounds of the carotid. In this case the internal jugular was injured three fingers' breadth above the clavicle and ligated without further complications, when, fifteen days later, a secondary hemorrhage from the carotid occurred requiring a second interference. Recovery was uneventful.

These cases lead to the conclusion that although relatively easy to treat at the middle portion of the internal jugular, wounds of this vessel are difficult to diagnose and treat when they are seated in

the posterior infraparotid space, hence their peculiar gravity in this region.

Wounds of the Vertebral Vein.—I have had one case of this injury. It was a tear in the side of the vessel at the point of exit from the vertebral canal. A ligature was applied above and below the lesion. Two roots of the brachial plexus were also divided. The results were good as far as the vascular lesion is concerned.

Wounds of the Brachial Artery.—I have met with one instance of this lesion. The patient was brought in with a wound in the right scapular region due to exploding shell. The missile went through the base of the neck and became lodged under the sternal portion of the left sternomastoid muscle, which bulged outward from a large hæmatoma developed behind it. The incision made for ligature of the left carotid exposed a quadrangular foreign body, with sharp irregular edges, lying upon the internal jugular vein which was intact.

A large collection of clot was carefully turned out from the median part of the neck, when a jet of red blood appeared apparently coming from the right side. Compression was made and a "necktie" incision was made from one sternomastoid to the other. The arterial blood jet became stronger and was found to come from the brachial artery. The manubrium was quickly resected along with the internal end of the right clavicle and after plugging with gauze a large tear was discovered and clamped in the brachiocephalic trunk near its bifurcation. The patient, who had lost a great deal of blood, then had syncope and died.

Wounds of the Right Brachiocephalic Trunk and Terminal Portion of the Subclavian Vein.—The patient presented a wound from exploding shell in the right subclavicular region. Incision. Considerable venous hemorrhage. Incision along the upper border of the clavicle and resection of the internal half of the bone. A tear was found on the anterior aspect of the subclavian vein and brachiocephalic trunk. Hæmostats were applied, but the patient died from hemorrhage and shock.

These last two cases confirm the gravity of wounds of the brachial artery and brachiocephalic vein and there is little hope of saving the patient, especially if resection of the clavicle is not done at once, and I can only repeat what I have already said concerning low wounds of the carotid artery.

TREATMENT

General Considerations.—A horizontal plane passing through the neck at the level of the sixth vertebra behind the cricoid cartilage in front and the carotid tubercles on the sides separates the vessels into two compartments. The *upper* is essentially aortico-jugular, the *lower* in which the large vessels of the neck are to be found, namely, the primary carotid, internal jugular, subclavian vessels and their branches, one of which, the vertebral, ascends towards the carotid tubercle.

In *the upper compartment,* Farabeuf's incisions over the anterior border of the sternomastoid muscle exposes the primary carotid external and internal carotid and internal jugular vein. It is an excellent approach to these structures.

In the lower compartment the difficulties are greater. First, there are the *anatomic* difficulties, resulting from the hindrances due to the skeletal construction of the region. However, resection of the clavicle will generally give sufficient space and there will be rarely any need of completing it with resection of the sternal manubrium, excepting when one has to deal with lesions of the mediastinum.

It must be recalled that the subclavian artery presents different anatomic relationships on the right and on the left side. The multiplicity of the veins and arteries offers further difficulty so that a vertical incision made in the proper place must be selected not only to expose the primary carotid but the internal jugular as well. Now, the latter vessel at its terminal portion is often as much as two centimetres distant from the artery (see Fig. 5), so that although the incision over the anterior border of the sternomastoid muscle is good for ligature of the carotid it is defective in the case of the vein, which is completely hidden by the muscle. In order to operate with ease on the subclavian and its branches the proper incision is over the *posterior* border of the sternomastoid muscle. I have carried out this technic and have been surprised at the ease with which the various vessels of the region could be examined without causing any damage to the parts.

Secondly, there are the *clinical* difficulties, especially when there is a hæmatoma, making it difficult to decide upon which vessel has been injured by the missile. The trajectory followed by the projectile

must first be outlined in the mind, but if the missile is lodged somewhere in the parts radioscopy will greatly aid in the diagnosis. The *possible* diagnosis can, of course, only be made, namely, of a vascular lesion above, near the clavicle or below it. Now, this distinction is the only important point, because at operation all the vessels can be examined and all that is necessary to know in beginning the operation is what bone resections will be necessary.

It may also happen that the missile, having entered on one side of the neck, crosses to the opposite side, so that the diagnosis of the vascular lesion is made still more difficult. In all these cases all the vascular trunks must be inspected *de visu,* and it is on account of these anatomo-clinical considerations that I have devised the following operative technic (see Figs. 1 to 22, inclusive).*

In Fig. 1 the head, seen from the right, is turned away from the lesion. The first incision is made over the upper aspect of the clavicle on the *inner half* of the bone and then curves downwards and outwards at the level of the sternoclavicular joint. A second incision is then made at an angle to the first, about eight to ten centimetres long, following the posterior border of the sternomastoid muscle.

The second step is shown in Fig. 2. The sternomastoid muscle (right side of neck) is prudently divided one centimetre above its insertion to the clavicle. The periosteum is then peeled off, all the aspects of the clavicle at its middle, and then a Gigli saw is passed under the bone and then it is divided. The blade of the periosteal elevator is kept in contact with bone which it must not leave and is made to follow the posterior surface until it reaches the sternal joint, when it is made to disarticulate the clavicle with its meniscus. The bone is pulled strongly downward, attached by the insertions of the subclavian muscle and pectoralis major.

The sternomastoid muscle (Fig. 3), seen from the right, has been dissected off on its deep aspect and is turned upwards and forwards. The vein is exposed under the intermediary tendency of the omohyoid muscle, the anterior aspect of the internal jugular vein is being exposed by stripping it off the external border and deep aspect of the flat subhyoid muscles.

In Fig. 4 the right internal jugular vein has been exposed and followed down to its junction with the anterior and external jugulars,

* Figures 15 to 22, inclusive, will appear in Vol. II, Series 31.

which have been ligated and excised near their anastomosis. In Fig. 5 the right primary carotid is seen situated forwards and deeply in relation to the anterior border of the internal jugular. It is exposed, after having retracted the flat subhyoid muscles, which have been dissected off, and are retracted inwardly, while the anterior border of the internal jugular, previously dissected out, is retracted with a ligature outwardly. The artery can now be traced up to the brachial artery, while the origin of the subclavian artery can be seen, a traction thread having been passed under it.

The freeing of the posterior aspect of the right internal jugular (Fig. 6) and search for the extrascalenic portion of the subclavian artery can now be done by dividing the omohyoid muscle in its intermediary tendon. The trapezins and scapular veins are ligated and divided one centimetre from the posterior aspect of the internal jugular vein. The tendon of the anterior scalenus muscle is then exposed and followed down to tuberculum scaleni and then the extrascalenic portion of the subclavian artery is exposed.

To expose the branches of the subclavian artery and particularly the vertebral, it must be recalled that the latter vessel is the first given off from the upper aspect of the subclavian (Fig. 7). The right vertebral artery is seen by retracting the internal jugular inwardly, while an assistant raises the artery by the thread placed under it at its origin. The thyroid vessels are next retracted outwardly, as well as the phrenic nerve, which runs over the anterior aspect of the anterior scalenus and the vertebral artery, with its vein to the outer side, ascends towards the tuberculum caroticum. By following the phrenic nerve the internal mammary artery is reached, while by drawing the subclavian forwards the cervico-intercostal trunk can be seen.

Figs. 8 to 12 present the *left side* of the neck. To expose the internal jugular and subclavian vein the technic is as follows: The same incisions are used as those described and, after having resected the internal half of the clavicle (Fig. 8) and raised up the sternomastoid muscle, the internal jugular is searched for and its anterior aspect dissected off the surrounding structures (compare with Figs. 1, 2 and 3). Next the subclavian vein and its affluents are sought for, namely, the external and anterior jugulars. These two vessels are then ligated and the portion between the ligatures excised (compare with Fig. 4).

Fig. 1.

Vessels of the base of the neck. Incisions for their exposure (right side). The first incision (*A*) is made along the upper border of the clavicle over the inner half of the bone and curves downwards and outwards over the sterno-clavicular joint. The second incision (*B*) is 8 to 10 centimeters long and follows the posterior border of the sternomastoid muscle.

Fig. 2.

Vessels of the base of the neck (right side). Resection of the inner half of the clavicle.

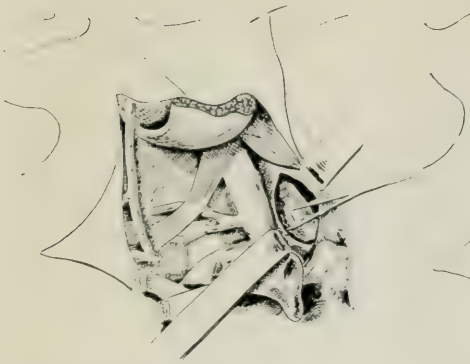
Fig. 3.

The sternomastoid muscle is dissected out on its deep aspect and divided. Exposure of the internal jugular vein (right side).

Fig. 4.

Exposure of the subclavian, external jugular and anterior jugular veins. Ligature and division of the two jugulars (right side).

FIG. 5.



Exposure of the common carotid artery, the brachiocephalic arterial trunk and origin of the subclavian artery (right side).

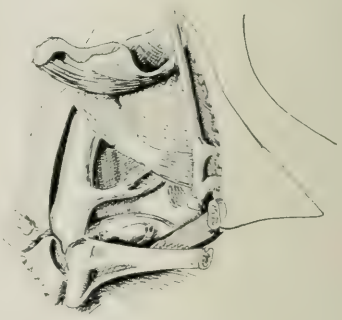
FIG. 6.

Exposure of the posterior border of the internal jugular vein and search for the extrascalenous portion of the subclavian artery (right side).

FIG. 7.

Search for the branches of the subclavian and vertebral artery especially (right side).

FIG. 8.



Resection of the clavicle. Exposure of the internal jugular. Ligature and division of the external and anterior jugulars. Exposure of the subclavian vein (left side).

Fig. 9.

Exposure of common carotid (left side).

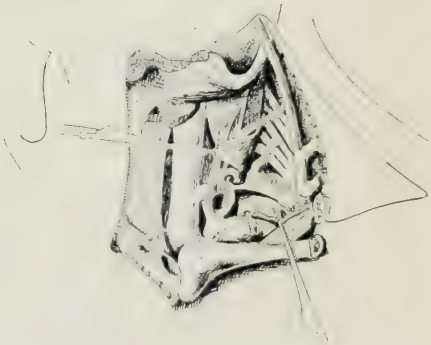
Fig. 10.

Filling the posterior border of the internal jugular vein, exposure of the subclavian artery and its branches to the inner side and afterwards to the outer side of the anterior scalenous muscle (left side).

Fig. 11.

The approach to the subclavian artery at its interscalenous portion (left side).

Fig. 12.



Division of the tendon of the anterior scalenous muscle (left side).

FIG. 13.

The relationship of the deep humeral artery and radial nerve.

FIG. 14.

The approach to the deep humeral vessels and radial nerve below the posterior border of the deltoid muscle.

Exposure of the main carotid, which vessel is, as we know, situated a little in front of, but especially more deeply seated than the internal jugular. It is hidden by the lateral lobe of the thyroid gland behind which it lies. The vessel is followed downwards (Fig. 9) and a temporary ligature is placed behind it at the level of the sterno-clavicular joint.

Exposure of the subclavian artery and its branches at the inner and outer side of the tendon of the anterior scalenus is done as follows (Fig. 10): The omohyoid is divided at the level of its intermediary tendon, the trapezius and scapular veins are double ligated and excised between the ligatures at a distance of one centimetre from the posterior border of the internal jugular vein (compare with Fig. 6, neck seen from the right side). Expose the tendon of the anterior scalenus; this is the first and most important landmark. The phrenic nerve is now exposed running along the anterior surface of this muscle. By following these downwards the subclavian is reached and when this vessel is recognized the internal jugular vein is retracted inwardly and the subclavian artery is traced towards its origin, care being taken not to injure the vertebral vein which crosses in front of it, and recognizing the vertebral artery which ascends along the inner side of the latter. A temporary ligature is passed under the subclavian artery near its origin.

When all this has been done any lesion of the intrascalenic portion of the subclavian artery can be dealt with, likewise wounds of the vertebral vessels. Should the lesion be seated on the subclavian in its extrascalenic portion, temporary hæmostasis having first been obtained, there will be no difficulty by following Farabeuf's technic to expose this segment of the artery on the outer side of the tendon of the anterior scalenus.

The Approach to the Subclavian Artery in Its Interscalenic Portion (Fig. 11).—If the subclavian artery be wounded in this segment of its course, the anterior scalenus must be divided, after which the artery is well exposed. Search must be made for the phrenic nerve, which is above near the external border of the anterior scalenus, and it can be felt on the anterior surface of this muscle. When found, it should be retracted inwardly. The suprascapular artery is excised between two ligatures and a grooved director is inserted to the outer side of the phrenic nerve and on the inner side of the terminal portion

of the tendon of the anterior scalenus. Keeping in close contact with the posterior surface of this tendon, the director is made to protrude beyond the external border of the muscle.

Continuing (Fig. 12) the operation, a knife is passed along the grooved director and the tendon is divided, care being taken to keep away from the phrenic nerve. After dealing with the lesions, the clavicle is put back in place and the scalenus and sternomastoid muscles sutured.

WOUNDS OF THE AXILLARY VESSELS

I have met with ten cases, as follows: In five the lesion was in the upper half of the vessel; in five in the lower half. An important fact to note is that in 60 per cent. of the cases only one vessel of the axillary bundle was involved. There were four cases in which both axillary artery and vein were injured, four of injury to the artery only, and two of the veins only.

In two cases the lesion found in the artery and vein were different. In one case there were several wounds in the axillary hollow, one under lower border of the pectoralis minor, a lateral wound in the axillary artery and about four centimetres lower down there was a complete rupture of both artery and vein.

In still another case there was a large lateral wound of the axillary artery and complete rupture of the vein. Of the eight remaining cases there were three of total rupture of the vessel or vessels and five of lateral wounds.

The cases of rupture were: One of both artery and vein, and two of complete rupture of the artery. The five cases of lateral wound were: One of lateral wounds of both artery and vein and two each of lateral wound of the artery only and vein only.

Hæmatomata are always very large in the axillary region, pushing forward the anterior wall and base of the axilla and often descending very far down the internal aspect of the arm. Therefore, the vessels must be exposed by a very long incision and all the more so because of the multiplicity of wounds in the axilla, hence the vessels may offer several lesions as I have had the opportunity of observing. In one case there was a lateral wound of the axillary artery underneath the lower border of the pectoralis minor in which suture was done. Then opening up a subjacent wound having a very oblique track upwards and outwards, I again came upon the vessels where a complete

rupture was found about four centimetres below the first vascular lesion. The two incisions were made into one, two ligatures were placed on each vessel, one above the lateral suture, the other below the rupture, and the arterial segment between them was excised. Recovery was uneventful, but time had been uselessly lost by making the lateral suture.

The muscular lesions in axillary wounds are seated in the pectoral muscles, but frequently the entrance aperture is quite remote from the site of the vascular lesion, so much so that the deltoid, latissimus dorsi, rhomboidens major and the subscapular are the seat of anfractuous tracts which should be carefully excised, as they might otherwise be the starting-point of gas gangrene.

In the series of cases that I have had the opportunity of studying there were no bone or nerve lesions of the brachial plexus, which are, however, rather frequent. In one case of wound of the axillary artery there was also a wound of the thorax with hæmoptysis as a symptom.

TREATMENT

In the majority of cases, wounds of the axillary artery and vein should be treated by ligature *in healthy tissue* above and below the lesion, with excision of the portion of the vessel between the ligatures. However, in a case of bullet wound of the stump of the left shoulder with great swelling of the anterior wall of the axilla, blanching of the skin of the arm and absence of the radial pulse, with complete impotency of upper limb, a diagnosis of rupture of the axillary artery was made, and the classic incision for ligature of the axillary under the clavicle was made. A guiding ligature was passed under the vessel. Then the entrance aperture was enlarged and the tract was found to lead down to a mass of clots which hid an almost complete transversal wound of the axillary artery.

The vessel was cleared and two small elastic clamps were placed above and below the tear. The wound in the vessel was cleansed with a saline solution, the edges evened and typical suture was done. The artery began to pulsate, but a little jet of blood coming from between the sutures required another one, which controlled the jet. The muscular fibres of the coracobrachialis were stitched over the vessel and the rest of the wound plugged with gauze. Recovery was uneventful, but functional impotency of the limb remained complete.

With the exception of this case of circular suture of the axillary artery, the other seven cases were treated by ligature. This is usually successful, excepting in the lower part of the artery, because in three cases of wounds in the lower third of this vessel ischemic gangrene of the forearm arose in one case and necessitated amputation of the arm in the lower fourth on the fourth day following ligature.

The case is yet another example of the classic opinion according to which ligature of the axillary artery is only dangerous in its lower portion, below the origin of the circumflexes, and, therefore, it is especially in these cases that lateral or circular suture of the vessel should be attempted. Finally, injury to such important vessels as the axillary artery and vein may cause death from anæmia, as occurred in one case out of the ten observed.

OPERATIVE TECHNIC

In dealing with vascular lesions in the axilla it is usually better to go under the clavicle for exposure of the artery and then to pass a temporary ligature under the vessel in order to obtain temporary hæmostasis. Then, following the artery, the anterior wall of the axilla is split up between the clavicular fibres of the pectoralis major. If necessary, the pectoralis minor may be divided perpendicularly to its fibres. Usually, I have not found it necessary to resect the clavicle in order to obtain more working space, and then Fiolle and Delmas' technic should be followed in cases where the vascular lesion is seated very near to this bone.

WOUNDS OF THE BRACHIAL VESSELS

Superficial Brachial Vessels.—This series consists of seventy-one cases, as follows: The wound was in the upper third in sixteen cases, or about 20 per cent.; in the middle third in thirty-two cases, or about 45 per cent., and in the lower third in twenty-three cases, or about 35 per cent. Although the radial or ulnar vasculonervous bundle is usually totally involved, it not uncommonly happens that the brachial artery alone is the seat of a lesion or the veins without the artery may be injured. Almost always—seventeen times out of eighteen cases—a single brachial vein was involved, this being due to the arrangement of the veins which usually flank both lateral aspects of the artery, so that it is possible for a missile to injure a vein without involving

the artery, while should it involve both veins the artery, from its position between them, will have little chance of escaping injury as well.

Of the seventy-one cases there was complete rupture of the vessel involved in sixty-two and nine lateral wounds. The total rupture cases comprised forty-five of rupture of the artery alone or with a venous lesion; seventeen venous ruptures without arterial lesions. The lateral wounds involved the artery in eight and the vein in one case. Therefore, the brachial artery presented a lateral wound in 13 per cent. of the cases.

In one case I found a small bit of shell in a case of lateral wound which had destroyed one-third of the circumference of the brachial artery and plugged the aperture. Ligature above and below the lesion, with excision of the vessel between the ligatures and complete closure of the wound. Recovery uneventful.

A hæmatoma sometimes not only develops at the lower part, but by a retrogade progress it may extend as high as the lower border of the pectoralis major. This occurred in a case of wound of the brachial at the bend of the forearm.

Usually the hæmatoma remains located in the internal space of the arm, but it may extend into the posterior space following the deep brachialis, which it compresses and hence may interfere with its circulation. Usually in wounds of the brachialis at the fold of the forearm similar lesions to those that I shall describe in the case of the ulnar vessels in the upper third of the forearm are met with.

I have seen one case of encysted arterial hæmatoma resulting from division of the vascular bundle near the origin of the brachial artery. Perihæmatic œdematous gangrene was already beginning and there was a cavity in which the systolic wave produced pulsations similar to those of a true arterial aneurism.

In opposition to this case I would refer to another in which there was a seton wound at the middle third of the arm without hæmatoma. The radial pulse was weaker than in the opposite limb. The tract of the missile appeared to have involved the region of the vessels and these were exposed. A complete division of the brachial artery was found, which gave rise to no bleeding. This case is another example of the presence of the radial pulse, which is a misleading symptom and should never be the means of neglecting to explore the vessels when

there is absence of swelling or hæmatoma, which might seem to confirm the impression that the vessels had not been involved.

The necessity of carefully inspecting the vascular bundle finds another proof in the following case: A patient was brought in with a wound from exploding shell seated in the middle part of the external aspect of the right arm. The missile was located radiographically on the internal aspect of the limb near the vascular sheath. The entrance aperture was cut down on and carried directly down to the missile, which was removed. Nine days later there was secondary hemorrhage from an ulceration in the brachial artery. Excision of the lesion between the two ligatures.

This case is one of contusion of a vessel with formation of a small slough, which was eliminated on the ninth day. A careful inspection of the brachial artery at the time of the first operation might have led to a diagnosis and proper treatment of the lesion.

Another case, favorable for the procedure I advise, was that of a dry lateral wound of the brachial artery and division of the deep brachialis as well. Operation was done six hours after receipt of the injury, which was seated in the middle third of the posterior aspect of the left arm. The missile was located in front of the biceps and an incision was made over the course of the brachial vessels. A tangenital wound was found in the brachial artery, which had bled into its adventitia, resulting in the formation of a small clot. Ligature and excision of wounded portion of the vessel and ligature of the two divided brachial veins, removal of the missile. The median nerve was intact.

The entrance aperture was freely enlarged and the incision led down upon the deep brachial artery, which, with both veins, was divided; ligature. The radial nerve was intact. Recovery uneventful with an excellent result.

The muscular lesions in these cases are mostly confined to the biceps, which may be completely divided. The bones are also frequently injured, twenty-two times out of a total of seventy-one cases in this series, in other words, almost 33 per cent. The humerus was injured in about 25 per cent. of the cases, once at its upper third with division of the median nerve; eight times at its middle third, in one case with a vast muscular tear and comminuted fracture and division of the entire vascular bundle, necessitating primary amputation.

In one case there was contusion of the radial nerve, in another division of both radial and ulnar nerves; subperiosteal sequestrectomy and nerve suture.

There were four cases of joint fracture at the lower end of the humerus, three of which freely opening at the elbow-joint. In each the division of the vessels was complete and required primary amputation. In another case there was partial division of the median nerve; excision of the elbow and nerve suture.

In two cases there was fracture of the ulna in its upper third and in another there were lesions of the brachial artery and all of its veins and ulnar artery.

The radius was fractured in its upper third in two cases, once with division of the median nerve as well, while in another case of fractured radius the brachial artery, its two satellite veins and its two bifurcating branches were all injured. Amputation for ischemic gangrene was necessary four days after the first interference for these lesions.

I also had one case of traumatic tearing off of the forearm with rupture of the brachial vessels, for which primary amputation at the lower third of the arm was done.

The study of these cases leads to the conclusion that in cases of wounds of the superficial brachial vessels in 25 per cent. there is also fracture of the humerus or the elbow-joint and that one in every sixteen of the cases the traumatic damage is such as to require primary amputation. This was indicated three times for the extensive joint lesions, while in a fourth case there was, besides extensive bone and vascular lesions, a vast muscular destruction.

The nerves were involved fourteen times out of the seventy-one cases, otherwise in about 20 per cent. There was one case of complete division of the median and partial division of the ulnar nerve; one case of complete division of the radial and ulnar nerve; two cases of total division of the median and five of partial division of this nerve. There were three cases of complete division of the ulnar nerve, one case of contusion of the radial and one of division of the internal cutaneous nerve.

The nerves most frequently involved were, therefore, the median, then the ulnar, a circumstance that is readily explained from the anatomic relations of these nerves to the vessels. At the elbow only

the median nerve is in proximity to the brachial vessels, hence the large number of injuries to it.

TREATMENT

The line given by Farabeuf from the apex of the axilla to the middle of the fold of the elbow-joint always gives easy access to the superficial brachial vessels as well as for exposing the satellite nerves for inspection. At the upper part of the arm it may become necessary to incise along the lower border of the pectoralis major if a hæmatoma extends behind this muscle or if the axillary must be ligated for a lesion situated at the point of origin of the brachialis. Sometimes the tendon of the pectoralis major must be divided.

At the fold of the elbow the incision should be continued downwards for four fingers' breadth onto the forearm in order to verify the condition of the radial and ulnar vessels. Ligature of the brachial artery in its middle and lower thirds is usually successful. I only had one case of sloughing after ligature of the terminal portion of the brachial for lesions located at the origin of the radial and ulnar arteries. This case will be referred to again. Ligature in the upper third of the brachial, especially above the origin of the deep brachial, is dangerous.

In three cases of ligation in the upper third of the brachial, otherwise one out of every five cases, ischemic gangrene ensued, necessitating amputation at the middle of the arm.

WOUNDS OF THE DEEP BRACHIAL VESSELS

Fourteen cases compose my series of these injuries. The entire vascular bundle was involved in all and in one case there was involvement of the superficial brachial vessels as well. I have only met with complete rupture of the deep brachial vessels. Deeply seated and well protected as they are by the triceps at the middle of the posterior aspect of the arm, by the supinator longus below and to the outer side, they usually are not injured unless there is a severe trauma of the arm, while, on the other hand, they are intimately related to the skeleton, so that it can readily be realized that lesions to these vessels are accompanied by fracture of the humerus in 66 per cent. of the cases. In fact, this bone was fractured in ten out of my fourteen cases; in one the fracture was incomplete. In their helicoidal course

around the humerus the deep brachial vessels are accompanied by the radial nerve. At its origin the deep brachial artery becomes detached from the external aspect of the superficial brachial artery and descends obliquely downwards and outwards, but its obliqueness approaches less to the vertical than that of the radial nerve, which it consequently crosses by passing over its anterior surface.

At the middle of the posterior aspect of the arm the artery, flanked by its two satellite veins, continues along the upper border of the radial nerve. The vessels thus reach the anterior space of the arm after having passed through the external intermuscular aponeurosis and here, on account of the torsion of the vasculonerve bundle around the bone, they became external, anterior and sometimes even internal to the radial nerve, which soon divides into its two terminal branches (see Fig. 13). In this region the vasculonerve bundle comprised between the supinator longus and the brachialis anticus is adherent to the undersurface of the former muscle.

The relations of the deep brachial vessels to the radial are such that five times out of fourteen wounds of these vessels are accompanied by injury to this nerve. Of the five cases, four times there was complete division of the nerve with fracture of the humerus. In the fifth case the radial nerve was dissociated, infiltrated with blood and the bone fractured.

It might be supposed that the coexistence of a nerve lesion and vascular rupture would be even more frequent, but this can probably be explained by the fact that the radial nerve is tough and resistant, while the walls of the vessels are thin and fragile. A bit of exploding shell or bone are enough to pierce the vessels but not the nerve.

TREATMENT

Inspection of the deep brachial vessels at their origin and first part of their course by resorting to the incision used for exposing the superficial brachial vessels, but for the remainder of their course I strongly advise the following procedure if muscular destruction is to be avoided:

An incision is made close to the posterior branch of the deltoid V, starting three to four centimetres above the apex of the V, and this is carried along the external bicipital groove. The incision should be about eight to ten centimetres long. The skin and fat having been

incised, the posterior fibres of the deltoid are seen and the blade of the knife should be kept in contact with the insertion of the aponeurosis of the muscle. By so doing the bone is directly attained. Then keeping close to it some fibres of the vastus externus muscle are detached with the elevator and the radial nerve and vascular bundle come into view (see Fig. 14). A retractor placed on the external border of the incision will offer an excellent view of the region. As to the portion of the vessels situated at the posterior aspect of the bones, it can be exposed by either the internal or external incision.

WOUNDS OF THE RADIAL VESSELS

I have had a series of forty-seven wounds of the radial vessels, as follows: Eleven in the upper third, otherwise about 30 per cent.; eighteen in the middle third, or about 35 per cent., and eighteen in the lower third, about 35 per cent. In most both artery and veins were involved, but I was able to observe three cases in which the veins were injured but not the artery. In two of these a single radial vein was wounded; in the third, both veins and the trunk of the interosseous artery were divided. In only one case was there a lateral wound of the vessels; division was complete in all the others.

As is the case for the ulnar vessels, it is in the upper third of the forearm that the largest amount of damage is done, because the muscular mass is here more developed and therefore the extent of muscular wounds is greater. The deep muscular interstices allow a hæmatoma to extend either upwards towards the brachial vessels or towards the external bicipital groove, where the clot may irritate the sensitive branch of the radial nerve.

The bones were injured in twenty-seven out of the forty-seven cases, therefore in about 60 per cent. Both bones of the forearm were fractured at the upper third in two cases, in another case in the lower third. The radius alone was fractured in twelve cases, twice in its upper third, six in its middle third, and in four in the lower third. The ulna was alone fractured in three cases, in all in its middle third.

The carpus was fractured in six cases, presenting low lesions of the artery. In one case the radius and carpus were fractured. In three cases the metacarpals were injured.

Consequently, alone or combined with the ulna or carpus, the radius, *satellite bone of the radial vessels,* is injured in about 33 per

cent. of the cases. An interesting fact is that when a fracture accompanies a lesion of the radial vessels and the radius is alone involved, the fracture is much more common in its upper and middle thirds, and this is as it should be, because in the upper third the bone is smaller, more movable and padded by muscular masses.

The nerves were involved in only three cases, and in one there was incomplete fracture of the ulna and division of both median and ulnar nerves. In one case the median was injured in the arm as well as the brachial artery and once the radial was injured in its sensitive branch. Therefore, associated lesions of the radial vessels and their satellite nerve are rare, and this is because in its upper third the radial is remote from the vessels, hidden as it is by the supinator longus, while at the lower third of the forearm it has left the anterior aspect of the limb.

TREATMENT

Lesions of the radial vessels are easily dealt with by incisions made on the ligature line given by Farabeuf, which extends from the middle of the fold of the elbow on the inner side of the tendon of the biceps down to the radial groove at the wrist, along the antibrachial groove.

(To be concluded.)

Progress of Medicine
For the Year 1920

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DISEASES OF THE LUNGS

THERE is probably no more discouraging condition, from the therapeutic standpoint, than *gangrene of the lung,* and it is, therefore, worth noting that another case has been recorded successfully treated by means of artificial pneumothorax (Loiseleur, *Bull. de la Soc. Med. des Hop.,* Paris, July 2, 1920, xliv, No. 24, p. 958), although Wessler (*Jour. Amer. Med. Assoc.,* December 27, 1919, lxxiii, No. 26, p. 1918) is strongly opposed to this method of treatment, believing it not only useless, but possibly harmful, preferring lobectomy in selected cases, and Peters (*Jour. Amer. Med. Assoc.,* October 16, 1920, lxxv, No. 16, p. 1060) prefers early drainage. Encouraging results have also been reported following the administration of neoarsphenamin, although the number so treated is entirely too small for any definite conclusions as to its real value (Becher, *Med. Klin.,* Berlin, March 28, 1920, xvi, No. 13, p. 336; Stepp, *Therap. Halbmonats.,* Berlin, March 15, 1920, xxxiv, No. 6, p. 161; and Alsberg, *Deut. med. Woch.,* Berlin, July 15, 1920, xlvi, No. 29, p. 795).

The pulmonary process closely related to gangrene of the lung, namely, *pulmonary abscess,* is apparently not uncommon following tonsillectomy, although there is a considerable difference of opinion as to whether the infection is borne through the blood-stream, lymphatics, or bronchi (Lilienthal, *Surg., Gynec. and Obstet.,* Chicago, November, 1919, xxix, No. 5, p. 443; Burger, *Nederl. Tijd. v. Geneesk.,* Amsterdam, November 1, 1919, ii, No. 18, p. 1359; Simpson and Noah, *Penna. Med. Jour.,* Athens, Pa., March, 1920, xxiii, No. 6, p. 322; and Butler, *Jour. Amer. Med. Assoc.,* July 24, 1920, lxxv, No. 4, p. 233). That motor-driven anæsthesia-apparatus may be responsible for the inspiration of septic material is suggested by

Clendenning (*Jour. Amer. Med. Assoc.,* April 3, 1920, lxxiv, No. 14, p. 941), a view which is strongly opposed by Wilkinson (Corresp., *Jour. Amer. Med. Assoc.,* April 24, 1920, lxxiv, No. 17, p. 1183) and Flagg (Corresp., *Jour. Amer. Med. Assoc.,* April 24, 1920, lxxiv, No. 17, p. 1183).

The symptomatology of *foreign bodies in bronchi* has been very thoroughly covered by McCrae (*Amer. Jour. Med. Sci.,* Philadelphia, March, 1920, clix, No. 3, p. 313), who lays emphasis on decreased expansion on the affected side, the presence of very fine râles, and the "asthmatoid wheeze." He also states that some foreign bodies, such as peanuts, set up a very acute general process which is fairly distinctive. A not uncommon source of foreign bodies in bronchi are teeth or portions of the dental apparatus, Hedblom (*Annals of Surg.,* New York, May, 1920, lxxi, No. 5, p. 568) having collected forty-five cases from the literature and reported seven from the Mayo Clinic.

The frequency with which *bronchiectasis* occurs may be judged from the fact that D'Espine (*Arch. de Med. des Enf.,* Paris, December, 1919, xxii, No. 12, p. 653) has only encountered three cases among 4916 children studied during a period of nine years, and among 29,700 patients admitted to Brompton Hospital during the last twenty years Jex-Blake (*Brit. Med. Jour.,* London, May 1, 1920, i, No. 3096, p. 591) states that a clinical diagnosis of bronchiectasis was made in 567, or 1.9 per cent., although he is of the opinion that it was present in fully 5 per cent. of the patients admitted. He reports fifteen instances of intracranial abscess among the one hundred and eight fatal cases. A case of multiple brain abscesses secondary to bronchiectasis is reported by Saelhof (*Jour. Ment. and Nerv. Dis.,* Lancaster, Pa., April, 1920, li, No. 4, p. 330). The symptomatology and diagnosis of bronchiectasis has been described by Elliott (*Med. Record,* New York, August 14, 1920, xcviii, No. 7, p. 253) in his study of forty cases.

The X-ray has revealed a condition which was formerly practically unknown, namely, *diaphragmatic hernia.* The frequency with which it is now recorded is very striking, during the past year four cases having been reported by Bevan (*Arch. of Surg.,* Chicago, July, 1920, i, No. 1, p. 23), three by Macmillan (*Amer. Jour. Röntg.,* New York, March, 1920, vii, No. 3, p. 143), and one each by Foster (*New York Med. Jour.,* July 17, 1920, cxi, No. 3, p. 77), Riggs (*Annals of*

Surg., Philadelphia, March, 1920, lxxi, No. 3, p. 276), Frank (*Annals of Surg.,* March, 1920, lxxi, No. 3, p. 280), and Portis and Portis (*Jour. Amer. Med Assoc.,* November 6, 1920, lxxv, No. 19, p. 1262).

The clinical features of pulmonary syphilis have been described by Schröder (*Munch. med. Woch.,* Munich, December 5, 1919, lxvi, No. 49, p. 1401), as he believes it is commonly mistaken for pulmonary tuberculosis. He considers the Röntgen ray the most important means of establishing a differential diagnosis. That late syphilis of the lung occurs clinically more often than is generally taught is also the belief of Funk (*Amer. Rev. Tuberculosis,* Baltimore, February, 1920, iii, No. 12, p. 754; and *Penna. Med. Jour.,* Athens, Pa., March, 1920, xxiii, No. 6, p. 310), who reports in detail three cases.

ASTHMA

The possible relationship between occupation and certain cases of bronchial asthma is exemplified by the baker, reported by Rosenbloom (*Amer. Jour. Med. Sci.,* September, 1920, clx, No. 3, p. 414), who was sensitive to proteins of the rye and wheat globulin, and the pharmacist, observed by Peshkin (*Jour. Amer. Med. Assoc.,* October 23, 1920, lxxv, No. 17, p. 133), who was sensitive to ipecac. The newer methods of treatment of bronchial asthma have opened up a wide field for investigation, but it is to be hoped that further experience will so simplify the process that it may be more generally employed. The complete method of study of the asthmatic has been clearly outlined recently by Sanford (*Minn. Med.,* Minneapolis, April 20, 1920, iii, No. 4, p. 174), and by Gottlieb (*Jour. Amer. Med. Assoc.,* April 3, 1920, lxxiv, No. 14, p. 931), the latter having also published the results of his specific treatment in a later paper (*Jour. Amer. Med. Assoc.* September 18, 1920, lxxv, No. 12, p. 814). The extreme care that must be employed in efforts to desensitize these asthmatic cases is well illustrated by the unfortunate case reported by Boughton (*Jour. Amer. Med. Assoc.,* December 27, 1919, lxxiii, No. 26, p. 1912), in which death resulted from the intravenous administration of one minim of horse serum to a patient suffering from horse asthma.

Peptone has been employed by Auld (*Brit. Med. Jour.,* London, April 24, 1920, i, No. 3095, p. 567) with success in a certain pro-

portion of cases, although Pagniez (*Presse Méd.,* Paris, January 24, 1920, xxviii, No. 7, p. 65) found the benefit from this method of treatment merely temporary. Treatment by means of autogenous vaccines has been carried out by Hutcheson and Budd (*Virginia Med. Monthly,* Richmond, February, 1920, xlvi, No. 11, p. 281) in eighty-one cases, with complete freedom from asthma or a definite decrease in the frequency and severity of the attacks in 74.6 per cent.

Exposure of the pituitary to the Röntgen ray, in five cases of asthma was followed by pronounced improvement, according to Ascoli and Fagiuoli (*Riforma Med.,* Naples, July 10, 1920, xxxvi, No. 28, p. 622). For relief during the attacks Maira (*Anales de la Facult. de Med.,* Montevideo, July–August, 1919, iv, Nos. 7–8, p. 515) is convinced there is nothing to compare with epinephrin, and he contends that even long-continued use of this drug has apparently no serious by-effects, one patient receiving more than 300 injections over a period of five years. Many cases of asthma have been relieved by benzyl benzoate, according to Hirschfelder (*Minn. Med.,* St. Paul, August, 1920, iii, No. 8, p. 380), who gives the following formula for rendering the drug less unpleasant to take: pure benzyl benzoate, 10 parts; emulsion of acacia, 5 parts; elixir eriodictyon aromaticum (N.F.), 35 parts; dose, one teaspoonful.

HAY FEVER

The frequent causes and the treatment of perennial hay fever have been described by Walker (*Jour. Amer. Med. Assoc.,* September 18, 1920, lxxv, No. 12, p. 782), who gives in detail the various excitants.

PNEUMONIA

As a means of preventing the spread of the disease and the increase in the number of carriers, the extreme importance of segregating pneumonia patients is emphasized by Southworth (*Jour. Amer. Med. Assoc.,* October 2, 1920, lxxv, No. 14, p. 919), and the methods for detecting and disinfecting carriers have been studied experimentally by Sailer, Hall, Wilson and McCoy (*Arch. Intern. Med.,* Chicago, Ill., December 15, 1919, xxiv, No. 6, p. 600), employing for the latter dichloramin-T, chlorin gas, phenol, iodin and quinine. That protection against pneumococcus infection in mice is conferred by pneumococcus lipovaccine has been demonstrated by Lewis and Dodge

(*Jour. Exper. Med.,* Baltimore, February 1, 1920, xxxi, No. 2, p. 169), although Cecil and Blake (*Jour. Exper. Med.,* Baltimore, May 7, 1920, xxxi, No. 5, p. 519) found that pneumococcus saline vaccine produces a greater amount of protective substance in the serum than pneumococcus lipovaccine, both, however, failed to protect monkeys against pneumococcus pneumonia, although they did modify the course of the disease. Experimental pneumonia in monkeys has been carefully studied by Cecil and Blake, the disease being pathologically identical with the disease in human beings (*Jour. Exper. Med.,* Baltimore, April 1, 1920, xxxi, No. 4, p. 445). They found that an attack of experimental pneumococcus Type I pneumonia confers an immunity of undetermined duration against infection with homologous type of pneumococcus (*Jour. Exper. Med.,* Baltimore, June 1, 1920, xxxi, No. 6, p. 657), and that subcutaneous injection of small doses of living virulent pneumococcus Type I seemed to protect them against experimental pneumococcus pneumonia of homologous type (*Jour. Exper. Med.,* Baltimore, June 1, 1920, xxxi, No. 6, p. 657). A specific therapeutic effect was also noted in experimental pneumococcus Type I pneumonia from the intravenous injection of Type I anti-pneumococcus serum (*Jour. Exper. Med.,* Baltimore, July, 1920, xxxii, No. 1, p. 1).

Anti-pneumococcus serum (Kyes') was employed by Gray (*Amer. Jour. Med. Sci.,* Philadelphia, June, 1920, clix, No. 6, p. 885) in 234 cases with a mortality of 16.7 per cent., compared to a mortality of 53.6 per cent. among 1684 similar cases treated without serum. In Type I pneumonia Tenney and Rivenburgh (*Arch. Intern. Med.,* Chicago, November 15, 1919, xxiv, No. 5, p. 545) employed autogenous serum in sixty-one cases with a mortality of 14.7 per cent. Grave pathologic anatomic lesions were observed by Sloboziano (*Presse Med.,* Paris, September 29, 1920, xxviii, No. 70, p. 688) from the injection of anti-pneumococcus serum directly into the lungs of experimental animals. A persistent fall in the blood-pressure was apparently the cause of death in four cases of pneumonia observed by Edgeworth (*Bristol Medico-Chi. Jour.,* June, 1920, xxxvii, No. 139, p. 88), who believes tyramin in doses of one-third of a grain hypodermically may be useful if administered directly the blood-pressure begins to fall. Pneumonia in a woman with habitually high blood-pressure caused a drop in pressure from 225 to 130, the blood-pressure

rising after recovery, according to Konikow (*Bost. Med. and Surg. Jour.*, July 1, 1920, clxxxiii, No. 1, p. 23).

INFLUENZA

During the past year there appeared in this country an epidemic of influenza which reached its peak of intensity about February 14th (*Jour. Amer. Med. Assoc.*, March 13, 1920, lxxiv, No. 11, p. 744), at no time or place, however, reaching the widespread character or intensity of the 1918 epidemic, although accompanied in some cities by a relatively high death-rate. In Chicago, for example, Small and Stangl (*Jour. Amer. Med. Assoc.*, April 10, 1920, lxxiv, No. 15, p. 1004) report on 1128 patients admitted to the Cook County Hospital with a death rate of 23.4 per cent. as compared to 31 per cent. in the same hospital during the pandemic. The recurrent epidemic was also characterized by certain pathological variations from the pandemic, according to Symmers, Dinnerstein and Frost (*Jour. Amer. Med. Assoc.*, March 6, 1920, lxxiv, No. 10, p. 646), in more frequent involvement of the pleura, the high proportion of pulmonary abscesses, the relative infrequency of pneumonia, the frequency and intensity of acute degenerative changes in the heart muscle, liver and kidneys, and the presence of streptococcal septicæmia as indicated by positive blood cultures.

No more striking illustration of the diversity of opinion as to what constitutes a complete health regulation against influenza could be obtained than that afforded by the results of the questionnaire sent out to various health officers by the State of Minnesota (Feezer, L. W.: "Comparative Study of State Regulations for the Control of Influenza," *Pub. Health Rep.*, 35: 2155 (September 10), 1920). The measures for preventing plague in the opinion of Broquet (*Bull. de l'Acad. de Med.*, Paris, February 3, 1920, 83, No. 5) would be equally effectual against influenza, including protection of the face, disinfection, aëration, forbidding of public gatherings, quarantine in the ports, vaccination of arrivals and serotherapy against the known germs (Pfeiffer, pneumococcus and streptococcus). That the disease is transmissible by means of the nose and throat secretions of persons suffering from the disease, with the nose and mouth as portals of entry, is indicated by the experiments of Leake (*Bost. Med. and Surg. Jour.*, December 11, 1919, clxxxi, No. 24, p. 675), the cus-

tomary measures of prevention being, therefore, reasonable. While masks are believed by Josefson (*Hygiea,* Stockholm, February 29, 1920, lxxxii, No. 4, p. 113) to have been largely responsible for the prevention of the disease in the nurses under his observation, and Hurley (*Med. Record,* New York, October 18, 1919, xcvi, No. 16, p. 651) considers them a valuable adjuvant to all other measures of prophylaxis, Lauterburg (*Corresp.-Blatt fur Schw. Aerzte,* Basel, November 20, 1919, xlix, No. 47, p. 1786) claims that the usual influenza masks are readily permeable for bacteria.

Our attention has been so centred upon droplet infection as the most important method of dissemination of this disease that we have failed to consider the possibility of other modes of spreading. That the disease may be spread by eating utensils in public eating places and institutions is called attention to by Cummings (*Amer. Jour. Pub. Health,* N. H., November, 1919, ix, No. 11, p. 849), a view which he supports by a series of experiments (*Military Surg.,* Washington, D. C., February, 1920, xlvi, No. 2, p. 150). No evidence was found by Nichols (*Jour. Laborat. and Clin. Med.,* St. Louis, May, 1920, v, No. 8, p. 502) to support this theory that these organisms (streptococci) spread through dishwater, supporting the inhalation theory of the transmission of respiratory diseases. Handshaking as a possible factor in the spread of disease is emphasized by Hill (*Modern Medicine,* Chicago, January, 1920, ii, No. 1, p. 72). That fleas may be a means of spreading the disease is suggested by Engelbreth (*New York Medical Journal,* May 15, 1920, cxi, No. 20, p. 846), although his experiments were not very convincing.

The problem of etiology of the recent pandemic continues to hold the interest of numerous writers, one of the most interesting phases of which is the possibility of a well-recognized and widespread organism developing an excessive virulence or pathogenicity. That this is possible is the belief of Davis (*Jour. Amer. Med. Assoc.,* September 18, 1920, lxxv, No. 12, p. 792), Teissier (*Paris Medical,* January 24, 1920, x, No. 4, p. 69) and Rolleston (*Jour. Amer. Med. Assoc.,* May 29, 1920, lxxiv, No. 22, p. 1495). This change in virulence of hæmolytic streptococci has been noted by Nakayama (*Jour. Infect. Dis.,* Chicago, September, 1920, xxvii, No. 3, p. 270) as the result of cultural and inoculation methods, and by Rosenow (*Jour. Infect. Dis.,* Chicago, June, 1920, xxvi, No. 6, p. 567) in the green-producing

streptococci from influenza patients. There are a number of investigators who maintain that the influenza bacillus, streptococcus and pneumococcus were merely secondary invaders, and that the primary essential etiological factor has not been discovered, or is probably a filtrable virus. Thus Turley (*Oklahoma State Med. Assoc. Jour.,* Muskogee, November, 1919, xii, No. 11, p. 311) believes this factor to be a very minute ultramicroscopic organism, possibly streptococcus pandemicus, or the filtrable micrococcus of the English investigators, while Olitsky and Gates (*Jour. Amer. Med. Assoc.,* May 29, 1920, lxxiv, No. 22, p. 1497) believe the filtrable, specific substance they have found in the nasopharyngeal secretions in the early hours of influenza is the actual cause of the disease, which may possibly have a close relation to the gram-positive, exceedingly minute bodies they have observed in cultures and in nasopharyngeal washings. The studies of Cunha, Magalhães and Fonseca (*Memorias do Inst. Oswaldo Cruz,* Rio de Janeiro, 1918, x, No. 2, p. 174) and the review of Destéfano and Tobias (*Semana Med.,* Buenos Aires, September 4, 1919, xxvi, No. 36, p. 249) support the acceptance of a filtrable virus as the etiological factor, while Fildes and McIntosh (*Brit. Jour. Exper. Path.,* London, June, 1920, i, No. 3, p. 159), consider the evidence unfavorable to such a view.

A survey made by Conner (*Jour. Laborat. and Clin. Med.,* St. Louis, September, 1920, v, No. 12, p. 767) revealed a direct relationship between streptococcus hæmolyticus and the influenza epidemic, while Tunnicliff (*Jour. Infect. Dis.,* Chicago, May, 1920, xxvi, No. 5, p. 405) has isolated a peculiar green-producing coccus from the œdematous brain in influenzal bronchopneumonia, and generally in pure culture. Rosenow (*Jour. Infect. Dis.,* Chicago, June, 1920, xxvi, No. 6, p. 469) has found green-producing streptococci more constantly and in larger numbers than any other organism, and has successfully reproduced in animals the picture of influenza as seen in man (*Jour. Infect. Dis.,* Chicago, June, 1920, xxvi, No. 6, p. 504). He also claims (*Jour. Infect. Dis.,* Chicago, June, 1920, xxvi, No. 6, p. 557) there is a true gastro-intestinal type of influenza due to green-producing streptococci similar to those isolated from the respiratory tract.

The rôle of bacillus influenza (Pfeiffer) in the pandemic is far from being definitely established, and while Fildes and McIntosh

(*Brit. Jour. Exper. Path.*, London, June, 1920, i, No. 3, p. 159) are in favor of this organism as the cause of influenza, and Edington (*Lancet*, London, August 14, 1920, ii, No. 7, p. 340) believes it the causal organism in certain of the epidemics he has studied, the serologic studies of Fleming and Clemenger (*Lancet*, London, November 15, 1919, ii, No. 5020, p. 869), Wyard (*Brit. Med. Jour.*, London, December 27, 1919, ii, No. 3078, p. 845) and Wollstein (*Journ. Exper. Med.*, Baltimore, December 1, 1919, xxx, No. 6, p. 555) would indicate that this bacillus was not the specific inciting agent. The bacillus influenza was a frequent finding in the throats of influenza patients, however, Arnold (*Jour. Laborat. and Clin. Med.*, St. Louis, July, 1920, v, No. 10, p. 652) reporting positive findings in 87.5 per cent., Matz (*Amer. Jour. Med. Sci.*, Philadelphia, November, 1919, clviii, No. 572, p. 723) in 39 per cent., and Walker (*Jour. Laborat. and Clin. Med.*, St. Louis, December, 1919, v, No. 3, p. 154) in 4 per cent., and Small and Stangl (*Jour. Amer. Med. Assoc.*, April 10, 1920, lxxiv, No. 15, p. 1004) in 100 per cent. Although the fact that Sellards and Sturm (*Bull. Johns Hopkins Hosp.*, Baltimore, November, 1919, xxx, No. 345) found the bacillus influenza in both measles and influenza patients constitutes suggestive evidence against its etiologic relationship in either disease.

The animal experiments of Albert and Kelman (*Jour. Infect. Dis.*, Chicago, December, 1919, xxv, No. 6, p. 433) on the pathogenicity of bacillus influenza suggest that while a possible etiologic relationship cannot be ignored, they failed to furnish any proof of this organism being the specific cause of influenza. The experiments on monkeys conducted by Blake and Cecil (*Jour. Amer. Med. Assoc.*, January 17, 1920, lxxiv, No. 3, p. 170) demonstrated that virulent influenza bacilli are capable of causing an acute infection of the respiratory tract when inoculated in monkeys, resembling the lesions found in the human being suffering from influenza, an observation of considerable pathological interest, even if one is not prepared to accept at present their conclusion that it seems reasonable to infer that the bacillus influenza is the specific cause of influenza.

The excessive mortality among pregnant women was one of the most striking features of the epidemic and one which still is receiving considerable attention in the literature. Among the more recent contributors Schmitz (*Deut. med. Woch.*, Berlin, November 27, 1919,

xlv, No. 48, p. 1328) reports a mortality of 46 per cent. among pregnant women as compared to 12.5 per cent. among the non-pregnant women, and Beuttner and Vulliéty (*Schweiz. med. Woch.,* Basel, January 22, 1920, l, No. 4, p. 61) state that of forty-seven pregnant or parturient women with influenza in their service 23.3 per cent. died.

The sequellæ which have attracted most attention are those connected with the central and peripheral nervous system, the psychoses being the most striking. The mental disorders following influenza have been described by Gordon (*Arch. Intern. Med.,* Chicago, December 15, 1919, xxiv, No. 6, p. 633), with a report of sixty-two cases. Another important complication of influenza is myocardial involvement, six interesting cases being reported by Hamburger (*Amer. Jour. Med. Sci.,* New York, October, 1920, clx, No. 4, p. 479), six by Minet and Legrand (*Paris Med.,* February 14, 1920, x, No. 7, p. 133), and Mason (*Modern Medicine,* Chicago, April, 1920, ii, No. 4, p. 305) reports a high proportion of cardiac cases among the after-effects of influenza as observed in his survey in Cincinnati.

That if influenza confers any immunity it is only of short duration seems to be indicated by the studies of Hall (*Ugesk. for Laeger,* Copenhagen, March 4, 1920, lxxxii, No. 10, p. 317) and Jordan and Sharp (*Jour. Infect. Dis.,* May, 1920, xxvi, No. 5, p. 463), and from the combined reports of the data obtained in the army hospitals published in the *Medico-Military Review,* issued by the Surgeon General's office. Favorable results from the employment of a prophylactic inoculation of a pure influenza bacillus vaccine are reported by Kanazawa (*Japan Med. World,* Tokio, August 21, 1920, x, No. 34), among those receiving two inoculations the morbidity was one-seventh and the mortality one-third of that noted among the non-vaccinated. Among 15,624 men receiving complete and incomplete vaccination, Leishman (Foreign Correspond., *Jour. Amer. Med. Assoc.,* March 20, 1920, lxxiv, No. 12, p. 814) is reported to have noted a morbidity of about one-third, and a death rate of nearly one-twentieth that obtaining among 43,520 non-inoculated. He believes (*Brit. Med. Jour.,* London, February 14, 1920, i, No. 3085, p. 214) that at least a moderate degree of protection against infection may be expected, while more decidedly beneficial effects might be hoped for in a diminution of both the frequency and the gravity of the pulmonary complications. A vaccine made up of seventeen strains of influenza bacillus has been

employed by Greeley (*Med. Record,* New York, October 11, 1919, xcvi, No. 15, p. 624) with favorable results, and Hurley (*Med. Record,* New York, October 18, 1919, xcvi, No. 16, p. 651) believes that mixed bacterial vaccines, including streptococci isolated from fresh cases, are useful and worthy of trial in the prophylaxis of the disease, although the experiments of Yabe (*Japan Med. World,* Tokio, February 1, 1920, x, No. 5, p. 105) would seem not to favor the possible protection of the animal by the administration of the vaccine. The experiments conducted by McCoy (*Amer. Jour. Pub. Health,* Boston, August, 1920, x, No. 8, p. 666), and those carried out by persons closely associated with the Hygienic Laboratory, were all carefully controlled and in every instance failed to show any evidence in favor of the prophylactic vaccine, whether the latter was made from Pfeiffer's organism alone or included in addition pneumococci and streptococci.

The employment of Rosenow's pneumococcic antigen was considered by Chaney (*Minn. Med.,* St. Paul, September, 1920, iii, No. 9, p. 436) a helpful therapeutic measure in the treatment of influenza, and Baerthlein and Thoma (*Munch. med. Woch.,* Munich, May 14, 1920, lxvii, No. 20, p. 563) found intramuscular injections of autogenous vaccines of value in influenzal pneumonia. Various measures have been employed with apparent benefit, Rosenow (*Jour. Infect. Dis.,* Chicago, June, 1920, xxvi, No. 6) using monovalent anti-streptococcus serum, diphtheria serum being administered by Gomibuchi (*Japan Med. World,* September 25, 1920, x, No. 39, p. 840), and influenza immune horse serum by Umeno, Watanabe and Sato (*Kitasato Arch. Exper. Med.,* Tokio, October, 1919, iii, No. 2, p. 151). While the use of convalescent serum was believed by the writers to be of value in treating influenza and influenzal pneumonia, the results obtained by Sanborn (*Bost. Med. and Surg. Jour.,* August 5, 1920, clxxxiii, No. 6, p. 171) and Francis, Hall and Gaines (*Milit. Surg.,* Washington, D. C., August, 1920, lxvii, No. 2, p. 177) were anything but convincing.

The intravenous injection of hydrogen peroxide in influenzal pneumonia was employed by Oliver and Murphy (*Lancet,* London, February 21, 1920, i, 5034, p. 432) in twenty-five severe cases, resulting in a decided decrease in their mortality and with strikingly beneficial results in some cases. The use of quinine is advocated by Caffrey

(*Jour. Amer. Med. Assoc.,* April 24, 1920, lxxiv, No. 17, p. 1166), and Points (*New Orleans Med. and Surg. Jour.,* January, 1920, lxxii, No. 7, p. 408) recommends the use of emetin hydrochlorid in the complicated cases of influenza, while Probst (*Revue Med. de la Suisse Romande,* Geneva, March, 1920, xl, No. 3, p. 145) claims benefit from the use of fixation abscesses induced by the subcutaneous injection of 1 c.c. of turpentine. It is to be regretted that with all the experience in the treatment of this disease our knowledge of its therapeutics is not more extensive and more definitely standardized.

STREPTOCOCCUS INFECTIONS

The frequency with which streptococcic infections, especially of the respiratory tract, were encountered during the influenza pandemic, and preceding and following the epidemic in the various military camps in this country, has aroused considerable interest in the distribution of this organism, its mode of dissemination and entrance to the body. The studies of Arnold (*Jour. Lab. and Clin. Med.,* St. Louis, June, 1920, v, No. 9, p. 591) are, therefore, of special interest from their bearing upon this problem confirming previous observations. He found among one hundred and sixteen influenza patients 100 per cent. showed the presence of non-hæmolytic streptococci in the throat, 48.2 per cent. showing hæmolytic streptococci; while in one hundred and thirty-four average throats (*Jour. Lab. and Clin. Med.,* St. Louis, June, 1920, v, No. 9, p. 587) 50.74 per cent. showed hæmolytic streptococci, and 91 per cent. were carriers of non-hæmolytic streptococci. In cultures taken from the throats of one hundred and forty officers Spooner (*Jour. Amer. Med. Assoc.,* February 28, 1920, lxxiv, No. 9, p. 582) found positive for streptococcus hæmolyticus in 83 per cent. on at least one examination, 25 per cent. on three or more trials and only 17 per cent. were consistently negative. Among fifty-five individuals who had had their tonsils removed, Van Dyke (*Jour. Amer. Med. Assoc.,* February 14, 1920, lxxiv, No. 7, p. 448) found markedly hæmolytic streptococci in 16.4 per cent., and in 29 per cent. less markedly hæmolytic streptococci, resembling Brown's Alpha prime type, only about 55 per cent. revealed no hæmolytic streptococci. Hæmolytic streptococci have also been found by Otteraaen (*Jour. Infect. Dis.,* Chicago, January, 1920, xxvi, No. 1, p. 23), but he states that these organisms are not virulent,

as indicated by animal inoculations and phagocytosis experiments. The characteristics of the various strains of streptococci have been studied by Clawson (*Jour. Infect. Dis.,* Chicago, February, 1920, xxvi, No. 2, p. 93).

The importance of the tonsillar crypts as foci for the harboring of hæmolytic streptococci has been emphasized by Davis (*Jour. Amer. Med. Assoc.,* January 31, 1920, lxxiv, No. 5, p. 317), who found these organisms present almost constantly.

This is an extremely important point to be borne in mind in studying various infections by means of throat cultures and reveals the hopelessness of any effort to correct the "chronic carriers state" on any large scale. The fate of the organisms which may gain entrance to the upper respiratory tract has been carefully studied by Bloomfield with the Sarcina lutea (*Bull. Johns Hopkins Hosp.,* Baltimore, November, 1919, xxx, No. 345, p. 317), bacillus coli and staphylococcus albus (*Bull. Johns Hopkins Hosp.,* Baltimore, January, 1920, xxxi, No. 347, p. 14), three strains of influenza bacilli (*Bull. Johns Hopkins Hosp.,* Baltimore, March, 1920, xxxi, No. 349, p. 85) and Friedlander bacilli (*Bull. Johns Hopkins Hosp.,* Baltimore, June, 1920, xxxi, No. 352, p. 203) by artificially introduced cultures. He found that the organisms remained in the nose and throat but a short time, it being impossible to recover them after twenty-four hours, although the bacillus coli and staphylococcus albus could be recovered for a somewhat longer period if introduced into tonsillar crypts. All his efforts to induce a chronic carrier state were ineffectual. It is interesting to learn that in view of the frequent presence of streptococci in the tonsillar crypts, many of which must be swallowed, that the natural defense of the body prevents their passage through the gastro-intestinal tract, as has been pointed out by Davis (*Jour. Infect. Dis.,* xxvi, 171, February, 1920). Another interesting study has been made by Winternitz, Smith and Robinson (*Bull. Johns Hopkins Hosp.,* Baltimore, March, 1920, xxxi, No. 349, p. 63), whose experiments indicate the possibility of pulmonary infection through the lymphatics directly from the tracheal submucosa.

LETHARGIC ENCEPHALITIS

Within the past few years there has appeared a form of encephalitis of a peculiar, striking form which has been termed lethargic

encephalitis, encephalomyelitis, or encephalomyelomeningitis, although "epidemic encephalitis" is preferred by some observers as the lethargy is not constant. The symptoms are so striking that it has received considerable attention from the lay press under the erroneous title "sleeping sickness," leading to the belief that it was more prevalent than was actually the case. There is no reason to suppose that it is a new disease, according to Buzzard and Greenfield (*Brain,* London, January, 1920, xlii, No. 4, p. 305), as endemic cases have occurred from time to time. The epidemiology of the disease is of considerable interest. Two outbreaks of a similar condition have been previously reported, according to Flexner (*Jour. Amer. Med. Assoc.,* March 27, 1920, lxxiv, No. 13, p. 865), the first in 1712 in Tübingen in Germany and the second in 1890 in Austria, Italy and Switzerland under the name of "nona." The present epidemic has been traced to an outbreak in Vienna and the surrounding districts in 1916, later appearing in England and France in the early part of 1918, and in this country for the first time during the winter of 1918–19. Even when epidemics developed in various localities, the total number of individuals affected has been relatively small, although in Paris and its environs there were one hundred cases at one time irregularly scattered throughout various quarters (Paris letter, *Jour. Amer. Med. Assoc.,* March 13, 1920, lxxiv, No. 11, p. 748).

The relationship between this disease and influenza, in view of their occurrence at approximately the same period, is of considerable interest, and while Re (*Riforma Med.,* Naples, October 4, 1919, xxxv, No. 40, p. 851) is convinced that lethargic encephalitis is a nervous complication or manifestation of influenza, Flexner (*Jour. Amer. Med. Assoc.,* March 27, 1920, lxxiv, No. 13, p. 865) and Economo (*Münch. med. Woch.,* Munich, November 14, 1919, lxvi, No. 46, p. 1311) believe that for the present they should be regarded as independent diseases. Crookshank (*Bost. Med. and Surg. Jour.,* January 8, 1920, clxxxii, No. 2, p. 34) is of the opinion that epidemic encephalomyelomeningitis bears the same epidemiologic relation to pandemic influenza, as have the prevalences and epidemics of "septic" pneumonia, of gastro-intestinal illness, and of other maladies described as occurring before and after the wide diffusions generally referred to as pandemic influenza, and Netter (*Bull. de la Soc. Méd. des*

Hôp., Paris, January 23, 1920, xliv, No. 3, p. 94) thinks that probably the factors responsible for influenza are the same which entail the other disease, although the two diseases are separate entities.

The pathology of the disease has been definitely established by numerous observers, the lesions consisting of monocellular aggregations about the blood-vessels; cellular infiltrations in the nerve tissues themselves; small, often microscopic hemorrhages and œdema, varying in their distribution but usually affecting the gray matter at the base of the brain, although any part of the gray matter may be involved. The structures particularly affected are those about the third ventricle, the aqueduct of Sylvius, the lateral ventricle and optic thalamus, and the pons and medulla, with a variable involvement of the spinal cord. The paralyses of the cranial nerves arise from cellular and other invasions of the nuclei of the nerves (Buzzard and Greenfield, *Brain,* London, January, 1920, xlii, No. 4, p. 305; Calhoun, *Arch. Neur. and Psych.,* Chicago, January, 1920, iii, No. 1, p. 1; Bramwell, *Lancet,* London, May 29, 1920, i, No. 5048, p. 1152; Alexander and Allen, *Arch. Neur. and Psych.,* Chicago, May, 1920, iii, No. 5, p. 485; and Boyd, *Canadian Med. Assoc. Jour.,* Toronto, February, 1920, x, No. 2, p. 117).

The etiology of the disease is still uncertain, Alexander and Allen (*Arch. Neur. and Psych.,* Chicago, May, 1920, iii, No. 5, p. 485) report negative cultures and smears, and Bramwell (*Lancet,* London, May 29, 1920, i, No. 5048, p. 1152), in his study of tissues, never found any organisms or bodies suggesting organisms. On the other hand, Maggiora and his co-workers (*Riforma Med.,* Naples, January 31, 1920, xxxvi, No. 5, p. 126) report the isolation of a gram-positive diplococcus from the blood of three cases of severe lethargic encephalitis which reproduced in guinea-pigs a fatal disease, simulating the disease in the human body. A non-motile coccus has been cultivated by Morse and Crump (*Jour. Lab. and Clin. Med.,* St. Louis, February, 1920, v, No. 5, p. 275) from fluid aspirated from the lateral ventricles of the brain in six cases. A green-producing gram-positive diplococcus has also been obtained by House (*Jour. Amer. Med. Assoc.,* March 27, 1920, lxxiv, No. 13, p. 884). The investigations of Loewe, Hirschfeld, and Strauss would seem to indicate that the disease was due to a filtrable virus, which they have cultivated successfully from the brain, naso-pharyngeal mucous mem-

brane, naso-pharyngeal washings, spinal fluid and blood (Loewe and Strauss, *Jour. Infect. Dis.,* Chicago, September, 1920, xxvii, No. 3, p. 251). They believe that Berkefeld filtrates of naso-pharyngeal washings from cases of epidemic encephalitis when injected intracranially into rabbits may aid in the diagnosis of the disease (Loewe and Strauss, *Jour. Amer. Med. Assoc.,* May 15, 1920, lxxiv, No. 20, p. 1373). Successful inoculation into rabbits of a filtrable virus has also been reported by Levaditi and Harvier (*Bull. de l'Acad. de Med.,* Paris, April 20, 1920, lxxxiii, No. 16, p. 365), and into a monkey by McIntosh and Turnbull (*Brit. Jour. Exper. Path.,* London, April, 1920, i, No. 2, p. 89). The brains of horses suffering from a disease which is pathologically apparently identical with lethargic encephalitis, have been found by Kraus, Kantor and Quiroga (*Revista del Inst. Bact.,* Buenos Aires, October, 1919, ii, No. 3, p. 239) to contain a gram-negative diplococcus which is capable of setting up the same disease when injected subdurally into horses.

While most of the cases reported have shown only one member of a family or intimate group being affected, or rarely two in a family, multiple infections have occasionally been recorded. The occurrence of twelve cases in a girls' home of twenty-one inmates has been reported by McIntosh (*Forty-eighth Annual Report of the Local Government Board, 1918–19, Medical Supplement,* London, 1919, p. 76), and three cases in one family are reported by Lévy (*Bull. de la Soc. Méd. des Hôp.,* Paris, July 9, 1920, xliv, No. 25, p. 1007). It seems rather odd that there is not a more definite focussing of the disease in view of its apparent infectious and communicable nature.

The disease has been under close observation such a short time that it is too early for any serious attempt at classification according to type. A disease which so frequently affects various portions of the brain in such a widespread, irregular manner, must naturally produce clinical pictures of great diversity which do not lend themselves readily to classification. The disease may be divided, according to Achard (*Paris Médical,* July 24, 1920, x, No. 30, p. 69), into the acute, subacute, slow and protracted forms, also recognizing an abortive form with complete recovery in three to five days. He insists that we cannot speak of a lethargic form, a neuralgic or myoclonic form, but can speak only of different types, and the following types may develop in turn in the single case: the ophthalmoplegic type;

the acute delirium type; the profound sleep type; the dazed or frozen type; the confusional, meningitic, myoclonic, choreic, athetosic and painful types, and the typhoidal type. While the most frequently recognized form has been characterized by lethargy, it may be seen from the types just mentioned that lethargy is by no means constant, and the disease may present the most varied pictures. All the cases may be divided into four main types, according to Sabatini (*Policlino,* Rome, January 26, 1920, xxvii, No. 4, p. 97); the lethargic, the motor excitement to actual chorea or tetany, the paralytic, and the mental confusion type. The myoclonic form has received considerable attention recently by such investigators as Sicard and Kudelski (*Bull. de la Soc. Méd. des Hôp.,* Paris, January 23, 1920, xliv, No. 3, p. 94), Sicard (*Presse Med.,* Paris, April 14, 1920, xxviii, No. 22, p. 213), Boveri (*Brit. Med. Jour.,* London, April 24, 1920, i, No. 3095, p. 570, and *Jour. Ment. and Nerv. Dis.,* Lancaster, Pa., April, 1920, li, No. 4, p. 409), Pardee (*Arch. Neur. and Psych.,* Chicago, July, 1920, iv, No. 1, p. 24), McAlpine (*Lancet,* London, August 14, 1920, ii, No. 7, p. 353), Spiller (*Arch. Neur. and Psych.,* Chicago, October, 1920, iv, No. 4, p. 370) and Taylor (*Arch. Neur. and Psych.,* Chicago, October, 1920, iv, No. 4, p. 417).

In the earlier descriptions of the disease the symptomatology was relatively constant, the disease developing slowly, or more frequently suddenly with chills, lassitude, malaise, headache and general pains, nausea and anorexia. The temperature usually running between 101° and 102° F., or rarely between 103° and 104° F. As the disease develops, lethargy or drowsiness arises, with vertigo, muscular weakness, blurred vision, diplopia, photophobia, tremors, delirium, restlessness, mental depression or confusion, difficulty in articulation and in swallowing, stiffness of neck and spasticity of other muscles, paralysis of facial and other nerves developing in some cases. The most striking symptoms being diplopia and ptosis, followed by lethargy; although the eye symptoms were not so frequently noted in some of the later cases under observation (Netter, *Bull. de l'Acad. de Med.,* Paris, January 6, 1920, lxxxiii, No. 1, p. 45). During the past year the most striking features noted are sharp, lancinating, neuralgic pains, explosive twitchings of the muscles in various segments of the body, especially of the abdominal muscles, parathesia, hyperesthesia, excitement and delirium. The rhythmic twitching of

the muscles, probably first described by Cruchet (*Brazil-Med.*, Rio Janeiro, July 3, 1920, xxxiv, No. 27, p. 427), was one of the earliest symptoms in a series of cases reported by Sabatini (*Policlinico*, Rome, January 26, 1920, xxvii, No. 4, p. 97), the jerking sometimes simulating actual chorea. That certain cases of acute, febrile chorea are a manifestation of acute epidemic encephalitis is the belief of Harvier and Levaditi (*Bull. de la Soc. Méd. des Hôp.*, Paris, May 7, 1920, xliv, No. 16, p. 583) and Lesné and Langle (*Bull. de la Soc. Méd. des Hôp.*, Paris, June 4, 1920, xliv, No. 20. pp. 765, 769, 784). The eye symptoms of the disease have been described by Woods (*Arch. Ophthalm.*, New York, November, 1919, xlviii, No. 6, p. 536) in seven cases, who emphasizes the presence of nystagmoid movements which were present in five of the cases, in two of which they were the only signs pointing to involvement of the eye muscles. Bilateral sympathetic ophthalmoplegia has been noted by Cadwalader (*Jour. Amer. Med. Assoc.*, May 8, 1920, lxxiv, No. 19, p. 1315) in two cases, a condition which he states is not known to occur in other diseases. In the paralytic cases, whether involving cranial or peripheral nerves, rapid, complete or partial clearing of the palsies has been noted, although this is not always the case. Many of the cases reported by Denechau (*Bull. Med.*, Paris, January 24, 1920, xxxiv, No. 5, p. 69) were left with contractures, uncertain gait, or ptosis. There was retrogression of the paraplegia in a case of spastic paraplegia following epidemic encephalitis reported by Léri and Gay (*Bull. de la Soc. Méd. des Hôp.*, Paris, June 18, 1920, xliv, No. 22, p. 876). A rather unusual sequel of the disease in children has been reported by Happ and Blackfan (*Jour. Amer. Med. Assoc.*, November 13, 1920, lxxv, No. 20, p. 1337), who noted persistent insomnia in a number of cases.

The diagnosis of the disease would appear to be unattended with any considerable difficulty in the cases in which the symptoms are at all characteristic. Many of the cases, however, have been mistaken for tuberculous meningitis, apoplexy, poisoning (botulism), syphilis and brain tumor.

The careful examination of the spinal fluid is of considerable help in establishing the diagnosis of epidemic encephalitis. The fluid is usually slightly in excess and invariably clear, with a cell count usually of ten to twenty, but occasionally as high as one hundred per cubic millimetre. While both small mononuclear and polymorpho-

nuclear cells may be present, several observers comment on the presence of a lymphocytosis (Barker, Cross and Irwin, *Amer. Jour. Med. Sci.,* Philadelphia, March, 1920, clix, No. 3, p. 337; Bénard, *Paris Medical,* June 5, 1920, x, No. 23, p. 474; Labbé and Hutinel, *Bull. de la Soc. Méd. des Hôp.,* Paris, February 6, 1920, xliv, No. 5, p. 179; Netter, *Bull. de l'Acad. de Med.,* Paris, February 3, 1920, lxxxiii, No. 5, p. 106; and Bassoe (Case 3), *Jour. Amer. Med. Assoc.,* April 10, 1920, lxxiv, No. 15, p. 1009). Globulin may be in excess (Malone and Maitra, *Indian Jour. Med. Research,* Calcutta, January, 1920, vii, No. 3, p. 526), but usually is only slightly or not at all excessive. Glucose is not constant, but is frequently 0.67 to 1.06 gm. per litre (Lesné and Langle, *Bull. de la Soc. Méd des Hôp.,* Paris, June 4, 1920, xliv, No. 20, p. 765; and Dopter, *Bull. de l'Acad. de Méd.,* Paris, March 2, 1920, lxxxiii, No. 9, p. 217). In four cases reported by Bassoe (*Jour. Amer. Med. Assoc.,* April 10, 1920, lxxiv, No. 15, p. 1009), the Lange gold test was negative twice, weakly positive once, and positive in one case; in five cases the globulin test (Nonne-Apelt) was negative twice, weakly positive once, and positive twice. Several observers remark the fact that the spinal fluid may be normal. During an epidemic of lethargic encephalitis in an individual suspected of the disease, Barker, Cross and Irwin (*Amer. Jour. Med. Sci.,* Philadelphia, March, 1920, clix, No. 3, p. 337) believe that a cell count of 10–100 small mononuclears, in a clear spinal fluid, with positive globulin, a negative Wassermann, and negative bacteriologic smears and cultures, should be considered strong corroborative evidence of the existence of the disease. Negative findings, however, do not rule it out.

The number of cases under observation in the series reported by various investigators is so small that it is difficult to arrive at any definite conclusions as to the mortality of this disease, but it appears to vary between twenty and forty per cent., the majority being in the neighborhood of thirty-five per cent. In one of the larger series, sixty cases reported by Boyd (*Canadian Med. Assoc. Jour.,* Toronto, February, 1920, x, No. 2, p. 117), the mortality was 38 per cent.

The treatment so far is purely empirical, as our knowledge of the disease is too rudimentary for the development of a rational therapeusis. Dieting and hygiene are the factors upon which at present we must chiefly rely, according to Denechau (*Bull. Med.,* Paris,

January 24, 1920, xxxiv, No. 5, p. 69) and House (*Jour. Amer. Med. Assoc.,* February 7, 1920, lxxiv, No. 6, p. 372), although frequent spinal drainage and the employment of hypertonic solutions intravenously in selected cases are advocated by Hoffman (*Indiana State Med. Assoc. Jour.,* Fort Wayne, July 15, 1920, xiii, No. 7, p. 228). Autoserum therapy has been employed by Brill (*Med. Record,* New York, June 26, 1920, xcvii, No. 26, p. 1079) in five cases, with marked improvement in four, injecting the patient's own blood serum into the subdural space after the withdrawal of an equal quantity of spinal fluid. Prompt subsidence of symptoms followed subcutaneous or intraspinal injections of antitetanic serum in three cases observed by Laubie (*Bull. de l'Acad. de Méd.,* Paris, March 16, 1920, lxxxiii, No. 11, p. 246). Hexamethylenamin has been employed by a number of observers, although Stahelin (*Schweiz. med. Woch.,* Basel, March 11, 1920, l, No. 11, p. 201) does not believe any convincing testimony has been presented as to its efficacy. The combination of hexamethylenamin and epinephrin, Netter (*Médecine,* Paris, August, 1920, i, No. 11, p. 668; and *Bull. de l'Acad. de Méd.,* Paris, March 30, 1920, lxxxiii, No. 13, p. 303) considers of value, although he chiefly depends upon "fixation abscess" in the treatment of this condition. He injected 1 c.c. of turpentine in a series of eighty-three cases, with a mortality of only 7.46 per cent. in the sixty-seven cases in which an abscess developed, while all but one died in the sixteen cases in which the injection failed to elicit abscess formation. In a later report the same writer states that these injections were employed in twenty-seven cases, thirteen of which were apparently hopeless, with the development of an abscess in nineteen, all but one of which recovered. In twenty-five grave cases in which no attempt had been made to induce abscess formation, more than 50 per cent. died. He ascribes its beneficial effect to a stimulating action on the organs which provide the natural means of defense. He also records recovery in a patient with extremely grave epidemic encephalitis after the development of a spontaneous deep abscess in the buttock. The single case in which Arana (*Juventud Méd.,* Guatemala, July, 1919, xviii, No. 194, p. 100) employed intravenous injections of 1 gm. of peptone, he ascribed the favorable outcome to this method of treatment, although the injections were followed by severe reactions.

TUBERCULOSIS

Artificial pneumothorax in the treatment of pulmonary tuberculosis continues to prove a valuable adjunct to the regular treatment in selected cases, Fagiuolo (*Annali di Clin. Med.,* Palermo, October, 1919, ix, No. 4, p. 21) reports improvement in forty-six out of fifty-six cases injected, five remaining stationary and in five the disease progressed, and Henius (*Deut. med. Woch.,* Berlin, October 23, 1919, xlv, No. 43, p. 1178) considers it a distinct advance in the treatment of tuberculosis. That this method is not without danger is emphasized by Cetrángolo (*Semana Méd.,* Buenos Aires, November 13, 1919, xxvi, No. 46, p. 603), who reports a case of gas embolism, as does also Thomas (*Jour. Amer. Med. Assoc.,* December 27, 1919, lxxiii, No. 26, p. 1936). Spontaneous perforation of the lung may occur, with induced pneumothorax, as Lux (*Progrès Méd.,* Paris, May 22, 1920, xxxv, No. 21, p. 231) points out, while Rautenberg (*Zeit. fur Tuberk.,* Leipzig, April, 1920, xxxii, No. 1, p. 13) relates the unfortunate results of this method of treatment in patients with barrel-shaped, rigid chest walls and a tendency to emphysema.

The complement fixation test in the diagnosis of tuberculosis has now been employed in a very large number of cases, many observers concluding from their investigations that we are dealing with a specific reaction, the presence of which indicates the presence of an active or recently active tuberculous lesion (Punch, *Lancet,* London, September 25, 1920, ii, No. 13, p. 647; Watkins and Boynton, *Jour. Amer. Med. Assoc.,* October 2, 1920, lxxv, No. 14, p. 933). Some investigators feel that it is not an absolute test, that many non-tuberculous cases will give a positive reaction, while in a certain proportion of tuberculous cases it will be negative (Buddy, *Missouri State Med. Ass'n Jour.,* St. Louis, April, 1920, xvii, No. 4, p. 145; von Wedel, *Jour. Immun.,* Baltimore, March, 1920, v, No. 2, p. 159; Pritchard and Roderick, *Jour. Amer. Med. Assoc.,* December 20, 1919, lxxiii, No. 25, p. 1879; and Stivelman, *Jour. Laborat. and Clin. Med.,* St. Louis, April, 1920, v, No. 7, p. 453). That it does not always indicate a clinically active process is the belief of Cooke (*Jour. Infect. Dis.,* Chicago, December, 1919, xxv, No. 6, p. 491) and Rogers (*Jour. Infect. Dis.,* Chicago, August, 1920, xxvii, No. 2, p. 101), and that the findings are negative when the tuberculous

lesion has healed is insisted upon by Rénon (*Médecine,* Paris, May, 1920, i, No. 8, p. 496). It is difficult to reconcile the view of Moursund (*Jour. Infect. Dis.,* Chicago, January, 1920, xxvi, No. 1, p. 85), who claims that the test is of no value as a diagnostic or prognostic aid, with that of Petroff (*Amer. Review Tuber.,* Baltimore, January, 1920, iii, No. 11, p. 683), who claims it is a more specific test than the Wassermann test in syphilis.

The relationship between *influenza* and *tuberculosis* is of considerable importance from several standpoints. While Amelung (*Münch. med. Woch.,* Munich, November 14, 1919, lxvi, No. 46, p. 1321) states that the influenza morbidity among patients with pulmonary tuberculosis is slight and that influenza takes a milder course in such patients, unless the tuberculosis is far advanced, Burnand (*Rev. Med. de la Suisse Romande,* Geneva, March, 1920, xl, No. 3, p. 145) and Anderson and Peters (*Amer. Rev. Tuber.,* Baltimore, April, 1920, iv, No. 2, p. 71) do not agree with this view, failing to observe any indication of an immunity to influenza among the tuberculous. That tuberculosis may be aggravated by influenza, or that tuberculosis may follow influenza is the belief of Lortat-Jacob (*Prog. Méd.,* Paris, February 28, 1920, xxxv, No. 9, p. 91), Anderson and Peters (*Amer. Review Tuber.,* Baltimore, April, 1920, iv, No. 2, p. 71), Peck (*Iowa State Med. Soc. Jour.,* Des Moines, February 15, 1920, x, No. 2, p. 42), and Amelung (*Münch. med. Woch.,* Munich, November 14, 1919, lxvi, No. 46, p. 1321), while Burnand (*Rev. Med. de la Suisse Romande,* Geneva, March 20, 1920, xl, No. 3, p. 145) and Fishberg (*Amer. Review Tuberc.,* Baltimore, November, 1919, iii, No. 9, p. 532) fail to note any noteworthy flaring up of tuberculosis after the influenza epidemic.

Recent experiences with the sugar treatment have been practically negative (Noguera, *Revista Espan. de Medic. y Cirugía,* Barcelona, February, 1920, iii, No. 20, p. 57; Escolar, *Boletín de Med. y Cir.,* Guayaquil, August, 1919, xvii, No. 123, p. 114; and Magalhães, *Arch. Brasil. de Med.,* Rio Janeiro, September, 1919, ix, No. 9, p. 736). The picric brass preparation which Ellis (*Lancet,* London, November 8, 1919, ii, No. 5019, p. 827) has found useful in lupus, has been tested clinically by Gauvain (*Brit. Jour. Tuberc.,* London, April, 1920, xiv, No. 2, p. 49) with promising results in suitably selected cases. The "copper cures" of last year have apparently

disappeared from the literature. Cerium salts have been studied by Grenet and Drouin (*Bull. de la Soc. Méd. des Hôp.,* Paris, May 7, 1920, xliv, No. 16, p. 589), and they believe that this method of treatment seems to offer real hope, although they warn that it must never be employed in the presence of fever. Their results Rénon (*Bull. de las Soc. Méd. des Hôp.,* Paris, May 7, 1920, xliv, No. 16, p. 602) considers "the most scientific yet realized in the chemotherapy of tuberculosis," and Esnault and Brou (*Bull. de la Soc. Méd des Hôp.,* Paris, May 7, 1920, xliv, No. 16, p. 606) believe the results were impressive in the twenty cases in which this treatment was employed. Animal experiments conducted by Frouin (*Bull. de l'Acad. de Méd.,* Paris, June 15, 1920, lxxxiii, No. 24, p. 549) with the sulphates of the cerium salts seem to give some support to the claims of Grenet and Drouin.

The diagnosis of ulcerative tuberculous colitis is exceedingly difficult by the ordinary clinical methods, but Brown and Sampson (*Amer. Jour. Röntg.,* December, 1919, vi, No. 12, p. 625; *Amer. Rev. Tuber.,* January, 1920, iii, No. 11, p. 698, and August, 1920, iv, No. 6, p. 451) believe that the findings by röntgenology are of the greatest value. Early diagnosis is possible with the X-ray, according to Paterson (*Amer. Rev. Tuber.,* Baltimore, August, 1920, iv, No. 6, p. 433) and Carman (*Jour. Amer. Med. Assoc.,* May 15, 1920, lxxiv, No. 20, p. 1371).

SYPHILIS

The prevalence of syphilis is a subject possessing sufficient interest to warrant quoting some of the figures obtained by various observers. Among white troops, Levin (*Jour. Lab. and Clin. Med.,* St. Louis, November, 1919, v, No. 2, p. 93) found a two-plus reaction in 10.5 per cent., and in colored troops in 18.3 per cent. Among railroad employes, Stokes and Brehmer (*Jour. Indust. Hyg.,* Boston, January, 1920, i, No. 9, p. 419) found syphilis in 11.7 per cent., among farmers in 1.5 per cent., among business men in 3.8 per cent. and among laborers in 6.1 per cent. In South Africa Pijper (*South African Med. Rec.,* November 8, 1919, xvii, No. 21, p. 323) found positive Wassermann tests in 10 per cent. of the small number (fifty) of apparently healthy natives he examined. Among 1320 pregnant women Goodman (*Surg., Gynec. and Obstet.,* Chicago, April, 1920,

xxx, No. 4, p. 368) found 6.7 per cent. gave four-plus positive reactions, 2 per cent. gave three-plus, and 87 per cent. were negative. Of the Wassermann-negative multiparas 37 per cent. gave a history of one or more miscarriages, as compared to 52 per cent. among the four-plus positive cases. In apparently healthy Indian male adults Iyengar (*Indian Jour. Med. Res.,* Calcutta, October, 1919, vii, No. 2, p. 398) found 22 per cent. showed latent or clinically inactive syphilis as demonstrated by the Wassermann test, and Ardenne (*Jour. de Med. de Bordeaux,* July 25, 1920, xci, No. 14, p. 379) found positive Wassermanns in 60 per cent. of the twenty-three deaf mutes he studied.

In young children Saint Girons (*Le Nourrisson, Paris,* November, 1919, vii, No. 6, p. 353) claims that a negative Wassermann does not exclude syphilis and a positive reaction is not in itself alone a positive sign of syphilis. That one should devote more study to the clinical features of all cases and not trust quite so implicitly to laboratory workers for a diagnosis is the opinion of Wolbarst (*New York Med. Jour.,* January 31, 1920, cxl, No. 5, p. 177), as he states that Wassermann tests performed by three different serologists will agree in only about 53 per cent. of the cases. In three thousand cases the Wassermann tests were made by two independent laboratories, and Solomon (*Jour. Amer. Med. Assoc.,* March 20, 1920, lxxiv, No. 12, p. 88) reports there was a complete uniformity of the findings in 93.44 per cent., the 6.56 per cent. variation including cases reported as doubtful. A comparison of the findings in one hundred and twenty-one cases studied postmortem by Turnbull (*Spec. Report Ser. 47, Med. Res. Com., Nat. Health Insur., H. M. Stationery Office,* London) with the Wassermann test performed antemortem showed it to be a diagnostic measure of astonishing precision. A comparison of the antemortem and postmortem Wassermann reaction in ninety cases showed flat discrepancies in only two instances, according to Graves (*Jour. Amer. Med. Assoc.,* August 28, 1920, lxxv, No. 9, p. 592). The decision as to whether a syphilitic can marry, Bejarano (*Repert. de Med. y Cirugía,* Bogota, January, 1920, xi, No. 4, p. 195) insists, cannot be based on a single Wassermann test. While Sargent (*Amer. Jour. Syphilis,* St. Louis, April, 1920, iv, No. 2, p. 286) considers the Wassermann an excellent control in the treatment of syphilis, Oettinger (*Amer. Jour. Syphilis,* St. Louis, April,

1920, iv, No. 2, p. 297) believes the test is not a reliable guide. An interesting study has been made by Strickler, Munson and Sidlick (*Jour. Amer. Med. Assoc.,* November 27, 1920, lxxv, No. 22, p. 1488), who found that among twenty-four non-syphilitics injections of arsphenamin resulted in inducing positive reactions in 66 per cent.

Certain changes have been suggested by Sachs and Georgi (*Münch. med. Woch.,* Munich, January 16, 1920, lxvii, No. 3, p. 66) in the technic of their test, in an effort to eliminate the occasional positive reactions that are not specific, and Bok (*Nederl. Tijd. Geneesk.,* Amsterdam, February 14, 1920, i, No. 7, p. 1328) and Wodtke (*Münch. med. Woch.,* Munich, April 9, 1920, lxvii, No. 15, p. 419) also suggest minor changes in the technic. The Sachs-Georgi test has been found by Morató (*Siglo Med.,* Madrid, November 29, 1919, lxvi, No. 3442, p. 1030) to parallel the Wassermann test more closely than any of the various serologic tests applied. The opinions as to the value of this test vary considerably, Messerschmidt (*Deut. med. Woch.,* Berlin, February 5, 1920, xlvi, No. 6, p. 150) and Merzweiler (*Deut. med. Woch.,* Berlin, November 13, 1919, xlv, No. 46, p. 1273) consider it a reliable substitute for the Wassermann test, Ariazzi and Pico (*Semana Méd.,* Buenos Aires, April 8, 1920, xxvii, No. 15, p. 500) found the tests agreed in 97 per cent. of cases, in 7000 tests Baumgärtel (*Münch. med. Woch.,* Munich, April 9, 1920, lxvii, No. 15, p. 421) found the results agreed in 90 per cent. of cases, and in 241 cases the findings according to Galli-Valerio (*Corresp.-Blatt fur Schw. Aerzte,* Basel, December 25, 1919, xlix, No. 52, p. 1977) agreed in 77.59 per cent. From 1000 tests Dekenga and Plantenga (*Nederl. Tijd. v Geneesk.,* Amsterdam, May 8, 1920, i, No. 19, p. 1631) believe the Sachs-Georgi test cannot be relied on alone, and Raabe (*Berl. klin. Woch.,* Berlin, October 27, 1919, lvi, No. 43, p. 1012) does not think it can be regarded as a substitute for the Wassermann test, though of 1750 parallel tests, both were positive in 659 cases and both negative in 1005. From a study of 1000 tests Wolffenstein (*Berl. klin. Woch.,* Berlin, November 24, 1919, lvi, No. 47, p. 1110) and his associates believe the usefulness of the test is limited.

The modes of administering arsphenamin are far from being standardized, opinions differing as to the relative value of the "intensive" treatment (Goodman, *New York Med. Jour.,* October 2, 1920,

cxii, No. 14, p. 494; and Ormsby, *Jour. Amer. Med. Assoc.*, July 3, 1920, lxxv, No. 1 p. 1), the continued treatment with mercury and iodides and occasional injections of arsphenamin (Scott and Pearson, *Canad. Med. Assoc. Jour.*, Toronto, October, 1920, x, No. 10, p. 916), and a concentrated or prolonged treatment (Gibson, *Brit. Med. Jour.*, London, January 24, 1920, No. 3082, p. 14). Several recommend administering the drug by the rectum (Wright, *New York Med. Jour.*, August 28, 1920, cxii, No. 9, p. 275; and Mandracchia, *Med. Record*, New York, January 24, 1920, xcvii, No. 4, p. 144), and Trossarello (*Policlin.*, Rome, August 3, 1919, xxvi, No. 31, p. 937) advises injecting it on the fascia lata instead of the muscle in those cases in which intravenous injections are not practicable.

The number of fatalities from the use of arsenobenzol compounds is increased each year, sixteen being reported by Foulerton (*Brit. Med. Jour.*, London, June 26, 1920, i, No. 3104, p. 864), in nine of which the appearance of jaundice was rapidly followed by death. Fifty-eight cases of delayed poisoning are reported by Strathy, Smith and Hannah (*Lancet*, London, April 10, 1920, i, No. 5041, p. 802; and *Canad. Med. Assoc. Jour.*, Toronto, April, 1920, x, No. 4, p. 336), four from the intensive administration of arsphenamin by Blanton (*Amer. Jour. Syph.*, St. Louis, October, 1919, iii, No. 4, p. 648), and one by Moore and Foley (*Arch. Dermat. and Syphil.*, Chicago, January, 1920, i, No. 1, p. 25).

Arsenical jaundice is not an uncommon complication during arsphenamin treatment (Hallam, *Lancet*, London, June 26, 1920, i, No. 5052, p. 1356; Chabrol and Khoury, *Paris Méd.*, December 13, 1919, ix, No. 50, p. 467; Sicard, *Bull. de la Soc. Méd. des Hôp.*, Paris, October 24, 1919, xliii, No. 29, p. 880; and Scott and Pearson, *Amer. Jour. Syphil.*, St. Louis, October, 1919, iii, No. 4, p. 628). That this jaundice is the result of the action of syphilis on the liver is the belief of Milian (*Bull. de la Soc. Méd. des Hôp.*, Paris, October 17, 1919, xliii, No. 28, p. 821), as he states arsphenamin has no affinity for the liver, a view which Sicard and his co-workers (*Bull. de la Soc. Méd des Hôp.*, Paris, October 17, 1919, xliii, No. 28, p. 833) do not accept. The reactions following the administration of arsphenamin vary greatly in severity and character, and Strickler (*New York Med. Jour.*, October 2, 1920, cxii, No. 14, p. 498) has found atropin and epinephrin chorid of no value in preventing their

appearance. That rubber tubing when new may cause reactions is the belief of Stokes and Busman (*Jour. Amer. Med. Assoc.,* April 10, 1920, lxxiv, No. 15, p. 1013), and Goldenberg (*Corresp. Jour. Amer. Med. Assoc.,* May 1, 1920, lxxiv, No. 18, p. 1271); and Roth (*Pub. Health Rep.,* xxxv, 2205, September 17, 1920) believes excessive shaking in the presence of air increases the toxicity of the drug. The experiments of Kolmer and Yagle (*Jour. Amer. Med. Assoc.,* March 6, 1920, lxxiv, No. 10, p. 643), Schamberg, Kolmer and Raiziss (*Amer. Jour. Med. Sci.,* Philadelphia, August, 1920, clx, No. 2, p. 188), Kolmer and Lucke (*Arch. Dermat. and Syphil.,* Chicago, September, 1920, ii, No. 3, p. 289) and Roth (*Arch. Dermat. and Syphil.,* Chicago, September, 1920, ii, No. 3, p. 292) indicate that neoarsphenamin possesses a lower toxicity than arsphenamin. Silver arsphenamin is believed by Galewsky (*Münch. med. Woch.,* Munich, January 30, 1920, lxvii, No. 5, p. 124) to be the most efficacious of all arsphenamin preparations that have appeared so far, an opinion shared by Hahn (*Deut. med. Woch.,* Berlin, January 22, 1920, xlvi, No. 4, p. 92), Rille and Frühwald (*Münch. med. Woch.,* Munich, October 24, 1919, lxvi, No. 43, p. 1226), Bering (*Deut. med. Woch.,* Berlin, May 13, 1920, xlvi, No. 20, p. 538), Nageli (*Schw. med. Woch.,* Basel, February 26, 1920, l, No. 9, p. 161), and Boas and Kissmeyer (*Ugesk. for Laeger,* Copenhagen, February 5, 1920, lxxxii, No. 6, p. 196). A case of *argyria* following the administration of silver arsphenamin is reported by Lochte (*Therap. Halbmonats.,* Berlin, June 15, 1920, xxxiv, No. 12, p. 334).

TYPHOID FEVER

The death rate from this disease is gradually declining in the registration area in the United States, which may be partially due to the army inoculations (*Jour. Amer. Med. Assoc.,* November 27, 1920, lxxv, No. 22, p. 1504), although the importance of an efficient health organization is well illustrated by the experience of South Carolina (reported by Riser, *Jour. Amer. Med. Assoc.,* June 12, 1920, lxxiv, No. 24, p. 1641). One of the largest typhoid fever epidemics that ever occurred in this country developed in Salem, Ohio (*Jour. Amer. Med. Assoc.,* November 27, 1920, lxxv, No. 22, p. 1498), recently, due to a contaminated water supply, and Bigelow and Berg (*Bost. Med. and Surg. Jour.,* May 6, 1920, clxxxii, No. 19,

p. 481) report a milk-borne epidemic, and Cornwall and Crawford (*New York Med. Jour.,* July 31, 1920, cxii, No. 5, p. 145) describe the epidemic of typhoid fever which occurred at Camp Hospital No. 10, Prauthoy, Haute Marne, A. E. F., France, which was water-borne in origin with carrier transmission.

An extremely complete and interesting article on typhoid fever in the American Expeditionary Forces has been contributed by Vaughan (*Jour. Amer. Med. Assoc.,* April 17, 1920, lxxiv, No. 16, p. 1074, and April 24, 1920, lxxiv, No. 17, p. 1145), including a clinical study of three hundred and seventy-three cases. The high degree of protection offered by vaccination is well illustrated by the statistics published by Russell (*Jour. Amer. Med. Assoc.,* December 20, 1919, lxxiii, No. 25, p. 1863) on typhoid fever in the American army during the World War, and the results of compulsory vaccination of the civilian population by the British forces in occupied German territory has been studied by Basten (*Deut. med. Woch.,* Berlin, March 18, 1920, xlvi, No. 12, p. 316), who believes the most noticeable effect was attenuation of the disease in the infected, as it was apparently without effect on the morbidity.

That carriers may constitute a grave menace to the health of the community during their entire lifetime is suggested by the study of Osborn and Beckler (*Jour. Infect. Dis.,* Chicago, August, 1920, xxvii, No. 2, p. 145) of the fifty-one known carriers in Massachusetts. Autogenous vaccine treatment resulted in apparent cures in two carriers reported by Kach (*Zeit. für klin. Med.,* Berlin, 1920, lxxxix, No. 1–2, p. 87), although bacilli were still present in the urine of a third carrier after a series of twenty-two injections. A simple and practical method for detecting carriers has been described by Liston and Gore (*Indian Jour. Med. Res., Spec. No.,* 1919, p. 107).

Antityphoid serum in the treatment of typhoid fever was administered by Rodet and Bonnamour (*Presse Méd.,* Paris, January 31, 1920, xxviii, No. 9, p. 81) to two hundred and forty-six patients, and they state that benefit was apparent in every stage of the disease, the serum being injected subcutaneously, only exceptionally by vein. Beneficial effect from vaccine treatment of typhoid fever in children is reported by Kharina-Marinucci (*Pediatria,* Naples, August 1, 1920, xxviii, No. 15, p. 706), being administered by the vein or intramuscularly. Intravenous injections of sensitized typhoid vaccine

were given by Stokes and Maldeis (*Bost. Med. and Surg. Jour.,* November 27, 1919, clxxxi, No. 22, p. 625) to ten typhoid patients with apparent benefit, and Adelung (*Calif. State Jour. Med.,* San Francisco, May, 1920, xviii, No. 5, p. 175) reports on twenty cases treated with intravenous injections of polyvalent sensitized typhoid vaccine as prepared by Gay, receiving the impression that the treatment was most effective when given at shorter intervals—two or three days.

TYPHUS FEVER

The destruction of lice has become a serious medical problem in view of the rôle played by these parasites in the transmission of typhus and, therefore, the studies of Hutchison (*Jour. of Parasitol.,* Urbana, Ill., December, 1919, vi, No. 2, p. 65) on the penetration of steam in bundles of clothing possesses considerable interest, as does the report of Allessandrini (*Annali d'Igiene,* Rome, September, 1919, xxix, No. 9, p. 557) on the effect of dry heat and sulphurous anhydrid on lice.

The diagnosis of typhus, Atria (*Revista Méd. de Chile,* Santiago, November, 1919, xlvii, No. 11, p. 867) believes, must be based on the clinical picture, the negative findings with tests for typhoid, and the character of the epidemic. A specific skin test for this disease has been devised by Friedberger and van der Reis (*Münch. med. Woch.,* Munich, September 19, 1919, lxvi, No. 38, p. 1075) employing a bacillus they call the Weil-Felix bacillus X 19. The Weil-Felix reaction was fairly constant in a small series of cases studied by Compton (*Lancet,* London, November 15, 1919, ii, No. 5020, p. 866), but Napier (*Lancet,* London, November 15, 1919, ii, No. 5020, p. 863) is of the opinion that this reaction will still have to be classed as an aid to diagnosis only. Pronounced agglutination with the proteus X has been obtained by Blanco and Tapia (*Siglo Méd.,* Madrid, November 1, 1919, lxvi, No. 3438, p. 931) in thirty-three cases of typhus, and Kramer (*Nederl. Tijd. v. Geneesk.,* Amsterdam, September 27, 1919, ii, No. 13, p. 894) found it useful in diagnosis but of no help in prognosis, while Monteleone (*Policlin.,* Rome, August 24, 1919, xxvi, No. 34, p. 1009) found parallel agglutination of the proteus X occurred with both the blood and spinal fluid.

An effective immunity could not be developed in experimental animals by inoculations of killed typhus virus by Möllers and Wolff (*Deut. med. Woch.,* Berlin, April 29, 1920, xlvi, No. 18, p. 484).

In the treatment of the disease Monziols and Collignon (*Bull. de la Soc. Méd. des Hôp.,* Paris, March 26, 1920, xliv, No. 12, p. 462) report favorable experiences with a vaccine made from proteus X 19, and Tanon (*Médecine,* Paris, December, 1919, i, No. 3, p. 133) comments on the successful results with antiserum and convalescents' serum.

DIPHTHERIA

The valuable assistance that has been rendered by diphtheria antitoxin during the twenty-five years that it has been employed is well illustrated by the review of Dubourg and Guénard (*Jour. de Med. de Bordeaux,* February 25, 1920, xci, No. 4, p. 83), which shows that the mortality in the Children's Hospital at Bordeaux has been reduced from 54 per cent. in 1888 to an annual average of 7.28 per cent., with a minimum of 1.53 per cent. in 1907.

The value of the Schick test for detecting the susceptible to infection has been recently emphasized by Leete (*Lancet,* London, January 24, 1920, i, No. 5030, p. 192), Renault (*Bull. de l'Acad. de Med.,* Paris, February 10, 1920, lxxxiii, No. 6, p. 130), and Renault and Lévy (*Bull. de la Soc. Méd. des Hôp.,* Paris, June 11, 1920, xliv, No. 21, p. 816). That it is of enormous practical value has been demonstrated by Blum (*Amer. Jour. Dis. Child.,* xx, 22, July, 1920), who has rendered a large home for infants diphtheria-free for the last five years by the injection of the susceptible. He found that the test showed about 37 per cent. were susceptible to the disease, a proportion which is practically identical with that cited by Armand-Delille and Marie (*Bull. de l'Acad. de Med.,* Paris, June 8, 1920, lxxxiii, No. 23, p. 530). Care must be employed in the preparation of the toxin, the technic of the test and the interpretation of the reaction, has been pointed out by Zingher (*Jour. Amer. Med. Assoc.,* November 13, 1920, lxxv, No. 20, p. 1333), as he found that some of the outfits obtained on the market contained too small an amount of toxin to give a positive reaction in Schick-positive children.

Active immunization against diphtheria by means of injections with a mixture of diphtheria toxin and antitoxin has been carried out by Gorter and Huinink (*Arch. de Méd des Enfants,* Paris, June, 1920, xxiii, No. 6, p. 338) in a large number of school children, and the production of antibodies supervised by the Schick test. In the two hundred and seventy-one showing positive reactions before treat-

ment it became completely negative in one hundred and thirty-eight and dubious in forty-nine, but persisted in forty. Just as successful results were obtained by Opitz (*Jahrbuch für Kinderh.*, Berlin, 1920, xcii, p. 189) by dilutions of pure diphtheria toxin, injected intradermally, as with Behring's toxin-antitoxin vaccine.

The control of the disease by means of searching for healthy carriers among school children is emphasized by Gloyne (*Jour. Amer. Med. Assoc.*, January 10, 1920, lxxiv, No. 2, p. 83), who found thirty-seven carriers among three hundred and sixty-seven children during an epidemic in a school. Three carriers among twenty-five newly admitted inmates of a sanatorium for children was observed by Huet (*Nederl. Tijd. v. Geneesk.*, Amsterdam, January 24, 1920, i, No. 4, p. 303). That the organisms from carriers may be virulent for several months has been determined by the studies of Wadsworth (*Jour. Amer. Med. Assoc.*, June 12, 1920, lxxiv, No. 24, p. 1633). Effectual sterilization of the throats of carriers is reported by Arloing (*Médecine*, Paris, December, 1919, i, No. 3, p. 168) with insufflation of desiccated serum prepared by injecting the horse simultaneously with diphtheria toxin and the bodies of the bacilli. The desiccated antitoxin is mixed with an inert powder and with gum tragacanth, the insufflations being given three or four times a day, between meals, after gargling with an antiseptic solution.

The effect of diphtheria on the heart has been studied by McCulloch (*Amer. Jour. Dis. Child.*, August, 1920, xx, No. 2, p. 87) and Aviragnet and Lutembacher (*Arch. des Mal. du Coeur.*, etc., Paris, January, 1920, xiii, No. 1, p. 1; and *Arch. des Mal. du Coeur*, etc., Paris, May, 1920, xiii, No. 5, p. 197); and Nuzum (*Jour. Amer. Med. Assoc.*, December 27, 1919, lxxiii, No. 26, p. 1925) found an eosinophilous myocarditis in seven of twenty-nine cases of diphtheria.

Nasal diphtheria in newly born children has been frequently observed by Becker (*Zentralb. für Gynak.*, Leipzig, December 6, 1919, xliii, No. 49, p. 996) and Hollatz (*Zentralb. für Gynak.*, Leipzig, February 21, 1920, xliv, No. 8, p. 195).

MUMPS

In confirmation of previous findings, Haden (*Amer. Jour. Med. Sci.*, Philadelphia, November, 1919, clviii, No. 572, p. 698) reports the isolating of a gram-positive diplococcus from the spinal fluid, the

blood and a lymph-gland, which produced a severe orchitis in the injected animals. Projection of the buccal orifice of Steno's duct, with a surrounding zone of redness in cases of mumps, has been noted by Cowie (*Amer. Jour. Dis. Child.,* Chicago, August, 1920, xx, No. 2, p. 75), who believes it a valuable sign in the diagnosis of this condition.

VARICELLA

Successful efforts to prevent chicken-pox by means of vaccination according to Kling's method have been reported by Steinert (*Zeit. für Kinderh.,* Berlin, July 28, 1920, xxvi, Nos. 1–2, p. 94), and careful clinical observations on an epidemic of this disease has been published by Stroh (*Zeit. für Kinderh.,* Berlin, August 16, 1920, xxvi, Nos. 3–4, p. 120), who believes that the blood findings possess diagnostic value. The possible relationship between herpes zoster and varicella has attracted considerable attention, and numerous reports have been published which seem to confirm the view that they are both manifestations of the same process (Feer, *Schweiz. med. Woch.,* Basel, January 15, 1920, l, No. 3, p. 41; Netter, *Bull. de l'Acad. de Méd.,* Paris, June 29, 1920, lxxxiii, No. 26, p. 588; McEwen, *Arch. Derm. and Syph.,* Chicago, August, 1920, ii, No. 2, p. 205; Frei, *Jahrb. fur Kindherh.,* Berlin, 1920, xcii, p. 281; Bruijning, *Nederl. Tijd. v. Geneesk.,* Amsterdam, September 20, 1919, ii, No. 12, p. 826).

PERTUSSIS

That there can be no question of the efficiency of the prophylactic vaccination against whooping-cough is the belief of Luzzatti (*Policlin.,* Rome, April 19, 1920, xxvii, No. 16, p. 451) from his experiments with the Bordet-Gengou organism, but he was unable to detect any benefit from its employment in the treatment of advanced cases. The employment of a vaccine made from the sputum for the treatment of whooping-cough impressed Bacigalupo (*Revista del Inst. Bact.,* Buenos Aires, October, 1919, ii, No. 3, p. 291) favorably.

The employment of intramuscular injections of 1 to 2 c.c. of ether on alternate days as a cure for whooping-cough is recommended by Cheinisse (*Presse Med.,* Paris, July 31, 1920, xxviii, No. 53, p. 526) and Audrain (*Bull. de la Soc. Méd. des Hôp.,* Paris, June 11, 1920, xliv, No. 21, p. 795; and *Médecine,* Paris, August, 1920, i, No. 11,

p. 694), the latter claiming that he has never known it to fail in uncomplicated cases. Marked improvement in symptoms in 50 per cent. of the one hundred and fifteen cases he treated with benzyl benzoate has been reported by Macht (*Bull. Johns Hopkins Hosp.,* Baltimore, July, 1920, xxxi, No. 353, p. 236) who employed a dose of five to forty drops of a 20 per cent. solution, three or four times a day, depending on the age of the patient and the severity of the disease.

MEASLES

Convalescents' serum has been employed by Degkwitz (*Zeit. für Kinderh.,* Berlin, May, 1920, xxv, Nos. 1–3, p. 134) as a prophylactic measure against this disease with very encouraging results, and Terrien (*Bull. de la Soc. Méd. des Hôp.,* Paris, December 26, 1919, xliii, No. 38, p. 1134) reported a very striking result, in a case of malignant measles, from the employment of the subcutaneous injection of 20 c.c. of whole blood from the child's brother, who had recovered from measles six months previously.

SCARLET FEVER

The investigations of Kobrak (*Zeit. für Kinderh.,* Berlin, August 16, 1920, xxvi, Nos. 3–4, p. 137) would appear to confirm the view that this disease is directly transmitted from the sick to the well, mainly by nasopharyngeal secretions. The influence of the school in the spreading of this and other contagious diseases of childhood is minimized by Palmer (*Weekly Health Review,* May 29, 1920, published by the Detroit Department of Health), who believes that the school attendance merely aids in revealing a larger number of cases, to which views Strode (*Corresp.-Jour. Amer. Med. Assoc.,* August 21, 1920, lxxv, No. 8, p. 557) takes exception.

Successful preventive inoculation with an anti-scarlet fever serovaccine, made according to Di Cristina's technic, has been reported by Spolverini (*Policlinico,* Rome, September 14, 1919, xxvi, No. 37, p. 1081). Experiments conducted by Tunnicliff (*Jour. Amer. Med. Assoc.,* May 15, 1920, lxxiv, No. 20, p. 1386) suggest that the hæmolytic streptococci of scarlet fever form a distinct group from the immuniologic point of view, and that possibly the serum produced with this group may prove of use in the diagnosis and treatment of scarlet fever.

Injection of convalescent serum dispelled the eruption of scarlet fever in the neighborhod of the site of the injection, according to Neumann (*Deut. med. Woch.*, Berlin, May 20, 1920, xlvi, No. 21, p. 566), only scarletinal eruption being blotted out. This procedure, first described by Schulz and Charlton, Neumann considers of the greatest diagnostic value.

The cardiac complications of scarlet fever observed among 1770 scarlet-fever patients have been described by Rosenbaum (*Arch. Intern. Med.*, Chicago, October, 1920, xxvi, No. 4, p. 424) as occurring in 106 of the cases. As a routine measure for detecting the onset of an impending kidney complication in this disease, Veeder and Johnston (*Amer. Jour. Dis. Child.*, March, 1920, xix, No. 3, p. 223) found the urinary examination for albumin of more value than the functional tests.

POLIOMYELITIS

The nasal route of infection in this disease has been studied by Flexner and Amoss (*Jour. Exper. Med.*, February 1, 1920, xxxi, No. 2, p. 123), who found an effective nasal mucous membrane prevents the passage of the energetically applied virus, that antiseptic solutions applied to the nasal mucous membranes were of doubtful value and may even be objectionable, and that infection may be blocked by the injection of poliomyelitic immune serum into the blood. A reduction of mortality from 47 to 12 per cent. is recorded by Rowan (*Med. Rec.*, New York, December 13, 1919, xcvi, No. 24, p. 972), which he attributes to the employment of Rosenow's serum, and serotherapy has been tried in Buenos Aires with quite encouraging results according to Escardó (*Revista Med. del Uruguay*, Montevideo, November, 1919, xxii, No. 11, p. 779).

MENINGOCOCCUS MENINGITIS

Intraspinal treatment of this condition, exclusive of serotherapy, has been studied by Neumann (*Therap. Monat.*, Berlin, August, 1919, xxxiii, No. 8, p. 369; and November, 1919, xxxiii, No. 11, p. 401) in connection with other forms of meningitis, and Farmachidis (*Gazz. degli Osped. e delle Clin.*, Milan, November 13, 1919, xl, No. 91, p. 988) reports a case in which recovery resulted from lavage of the spinal canal with physiologic solution. The combined intraspinal and

intravenous treatment resulted in a marked reduction in mortality, according to Haden (*Arch. Intern. Med.,* Chicago, November 15, 1919, xxiv, No. 5, p. 514). Determination of the type of organisms and treatment with serum of a corresponding type has proven very successful in the hands of Munro (*Brit. Med. Jour.,* London, March 27, 1920, i, No. 3091, p. 430). The combined serum and vaccine treatment is recommended by Méry and Girard (*Bull. Méd.,* Paris, November 22, 1919, xxxiii, No. 52, p. 691), Foti (*Ped.,* Naples, April, 1920, xxviii, No. 7, 321), Malvani (*Rivista di Clin. Ped.,* Florence, February, 1920, xviii, No. 2, p. 88) and Lewkowicz (*Arch. de Méd. des Enf.,* Paris, December, 1919, xxii, No. 12, p. 617), employing the serum intraspinally or even directly into the lateral ventricles (Malvain and Lewkowicz), while Waterhouse (*Brit. Med. Jour.,* London, January 10, 1920, i, No. 3080, p. 45) employs intrathecal injections of the patient's own blood serum.

Examination of the Spinal Fluid.—The study of this body-fluid has added materially to our diagnostic equipment, although we have not had sufficient experience with some of the tests to form an absolute diagnosis on this method alone. The value of the colloidal gold test of Lange in the diagnosis of general paralysis has been confirmed by Cruickshank (*Brit. Jour. Exper. Path.,* London, February, 1920, i, No. 1, p. 71), and Warwick and Nixon (*Arch. Intern. Med.,* Chicago, February 16, 1920, xxv, No. 2, p. 119) and Prunell (*Rev. Med. del Uruguay,* Montevideo, August, 1919, xxii, No. 8, p. 620) consider it of especial importance in the early diagnosis of neurosyphilis. The characteristic findings in the fluid in different pathologic conditions, especially in meningeal states of doubtful origin, have been enumerated by Aráoz Alfaro (*Anal. de la Facult. de Med.,* Montevideo, July–August, 1919, iv, Nos. 7–8, p. 469). The general physiology of the fluid has been studied by Becht (*Amer. Jour. Phys.,* Baltimore, February, 1920, li, No. 1, p. 1). The spinal fluid findings with spinal cord tumors have been investigated by Ehrenberg (*Hygiea,* Stockholm, December 31, 1919, lxxxi, No. 24, p. 970), and in mental diseases by Brunton (*Jour. Ment. Sci.,* London, October, 1919, lxv, No. 271, p. 249), while Rivers (*Jour. Amer. Med. Assoc.,* November 27, 1920, lxxv, No. 22, p. 1495) describes an indol test of value in the diagnosis of influenzal meningitis, and Morse and Crump (*Jour.*

Lab. and Clin. Med., St. Louis, December, 1919, v, No. 3, p. 185) present a method for the determination of excess preformed ammonia in the spinal fluid which they have found to possess great value for quickly determining the cause of coma.

CHRONIC ARTHRITIS AND FOCAL INFECTION

An exhaustive study of arthritis in the army, based on four hundred cases, has been contributed by Pemberton and his associates (*Arch. Intern. Med.,* Chicago, March 15, 1920, xxv, No. 3, p. 241 and p. 243; and April 15, 1920, xxv, No. 4, p. 335 and 351), who believe that treatment of these cases by a restricted carbohydrate diet has undoubted application in appropriate cases. Of the four hundred cases, two hundred and ninety-eight showed demonstrable surgical foci (*Arch. Intern. Med.,* Chicago, March 15, 1920, xxv, No. 3, p. 231), two hundred and eight of these being in the tonsils, the remainder being genito-urinary, dental, or combinations of these three. The importance of seeking for focal infections in every case of arthritis, where trauma, tuberculosis or malignancy are not self-evident causes, is emphasized by Gibney (*Jour. Orthopæd. Surg.,* Lincoln, Nebraska, February, 1920, xviii, No. 2, p. 63), who also cautions that the finding of one focus does not mean that this is the only focus having a bearing on the case. Streptococcus viridans was found by Richards (*Jour. Bact.,* Baltimore, September, 1920, v, No. 5, p. 511) in fourteen out of one hundred and four cases of chronic arthritis, and Hay (*Ohio State Med. Jour.,* Columbus, March 1, 1920, xvi, No. 3, p. 162) also considers this organism an important etiological factor, markedly beneficial results following the use of autogenous vaccine of the cultured streptococcus viridans and elimination of the source of toxæmia. Fifty per cent. of the cases of chronic arthritis observed by Chapman (*Annals Surg.,* New York, May, 1920, lxxi, No. 5, p. 648), treated by the removal of foci of infection, showed definite improvement.

Focal infection, especially the dental form, is believed by Cotton (*New York Med. Jour.,* April 17, 1920, cxi, No. 16, p. 672) to bear a definite relation to certain forms of mental disease, while Mills (*New York Med. Jour.,* April 17, 1920, cxi, No. 16, p. 661) considers the results of dental extraction in these cases not only unsatisfactory, but often harmful.

GONORRHŒAL ARTHRITIS

Pain induced by pressure on the intra-articular ends of the bones will serve to differentiate gonorrhœal polyarthritis from acute articular rheumatism, according to Dufour (*Bull. de la Soc. Méd. des Hôp.,* Paris, October 31, 1919, xliii, No. 30, p. 918), as he has never elicited pain by this procedure in the latter condition. Marked improvement in chronic gonorrhœal rheumatism was obtained by Fraser and Duncan (*Lancet,* London, January 31, 1920, i, No. 5031, p. 248) from the intravenous injections of vaccines, clinically they seemed to get the same results from T.A.B. vaccine as from a gonococcus or mixed vaccine. Cure, with normal joint functioning, was secured in fourteen out of fifteen patients treated with antigonococcus serum by Debré and Paraf (*Bull. de la Soc. Méd. des Hôp.,* Paris, October 31, 1919, xliii, No. 30, p. 908), the injections being made directly into the joints, supplemented with intramuscular and intravenous injections. Intramuscular injections of milk gave brilliant results in the treatment of gonorrhœal arthritis, according to Schulman (*Med. Rec.,* New York, July 10, 1920, xcviii, No. 2, p. 47).

CHOREA

The organism responsible for the production of acute endocarditis, acute rheumatic fever and chorea, Floyd (*Jour. Med. Res.,* Boston, May, 1920, xli, No. 4, p. 467) believes to be one or more members of the group of streptococci he has found in these cases. The effect of tonsillectomy in a group of eighty-five children who had previously presented one or several of the rheumatic manifestations, has been studied by St. Lawrence (*Jour. Amer. Med. Assoc.,* October 16, 1920, lxxv, No. 16, p. 1035) over an average period of three and one-half years after operation.

EPILEPSY

That this condition is closely related to endocrine disturbance is a view held by Perrin and Richard (*Rev. Neur.,* Paris, September, 1919, xxvi, No. 9, p. 698) and Bisgaard and Nϕrvig (*Hosp.,* Copenhagen, January 28, 1920, lxiii, No. 4, p. 49), while Pagniez and Lieutaud (*Prensa Med.,* Paris, November 19, 1919, xxvii, No. 69, p. 693) believe it may be of an anaphylactic nature. Sixteen cases have been treated by Maillard (*Encéphale,* Paris, July 10, 1920, xv,

No. 7, p. 455) with phenylethylbarbituric acid (luminal) with results which far surpass any he has witnessed under other measures.

DISEASES OF THE BLOOD

That *pernicious anæmia* may occasionally occur in a high proportion of the members of one family, is evidenced by the cases reported by Meulengracht (*Ugeskrift for Laeger,* Copenhagen, June 17, 1920, lxxxii, No. 25, p. 777). The possibility of many cases of pernicious anæmia being mistaken for arteriosclerosis is called attention to by Jones and Raphael (*Arch. Neur. and Psych.,* Chicago, July, 1920, iv, No. 1, p. 55), and the frequency with which these cases may present symptoms suggesting cancer of the stomach is illustrated by the cases reported by Kleemann (*Deut. Arch. für klin. Med.,* Leipzig, February 18, 1919, cxxviii, Nos. 5–6, p. 271), in which there was merely a simple hypertrophy of the pylorus. Transfusion was of value in securing a remission of symptoms in the cases reported by Graham (*Edinburgh Med. Jour.,* May, 1920, xxiv, No. 5, p. 282), Scheel and Bang (*Norsk. Mag. for Laege.,* Christiania, March, 1920, lxxxi, No. 3, p. 250), and Anders (*Amer. Jour. Med. Sci.,* Philadelphia, November, 1919, clviii, No. 572, p. 659), and Zadek (*Deut. med. Woch.,* Berlin, October 9, 1919, xlv, No. 41, p. 1133) gives in detail the treatment to which he subjects the patients suffering from this disease—including various medicines by mouth, subcutaneous injections of sodium arsenate, weekly intravenous injections of neoarsphenamin, daily alternating gastric and intestinal lavage.

Improvement in *leukæmia* from the administration of benzol has been reported by Pignetto (*Semana Méd.,* Buenos Aires, October 23, 1919, xxvi, No. 43, p. 489), but Ravenna (*Rif. Med.,* Naples, January 24, 1920, xxxvi, No. 4, p. 86) warns that this improvement is merely symptomatic and recurrences are the rule. Deep Röntgen-ray exposure is believed by Rosenthal (*Berl. klin. Woch.,* Berlin, November 24, 1919, lvi, No. 47, p. 1113) to be the most reliable treatment in leukæmia.

A rapid accurate determination of *hæmoglobin* is made by Berman (*Arch. Intern. Med.,* Chicago, November 15, 1919, xxiv, No. 5, p. 553) with the acid hæmatin method, while Robscheit (*Jour. Biol. Chem.,* Baltimore, February, 1920, xli, No. 2, p. 209) presents a

method which combines the advantages of Palmer's and Sahli's methods of hæmoglobin determination. The influence of diet and medication upon blood regeneration following simple anæmia has been experimentally studied by Whipple, Hooper and Robscheit (*Amer. Jour. Phys.,* Baltimore, September, 1920, ciii, No. 2, p. 151), who considered Blaud's pills inert when added to various diets which do or do not favor rapid blood regeneration. On the contrary, Nägeli (*Schw. med. Woch.,* Basel, July 29, 1920, l, No. 31, p. 661) and Alder (*Schw. med. Woch.,* Basel, July 29, 1920, l, No. 31, p. 663) report striking clinical results from the use of iron, especially when large doses were employed.

Polycythæmia rubra vera is believed by Herrnheiser (*Deut. Arch. für klin. Med.,* Leipzig, October 24, 1919, cxxx, Nos. 5–6, p. 315) to be due, not to bone marrow overproduction, but to some factor interfering with red-corpuscle destruction, and Thaysen (*Ugesk. for Laeg.,* Copenhagen, April 15, 1920, lxxxii, No. 16, p. 514) suggests the possibility of suprarenal insufficiency as an element in the clinical picture, as he noted remarkable fluctuations in the blood count which he believed due to changes in the capillaries. Röntgen-ray treatment in these cases is strongly recommended by Böttner (*Deut. med. Woch.,* Berlin, January 15, 1920, xlvi, No. 3, p. 66), although a patient reported by Forschbach (*Berl. klin. Woch.,* Berlin, November 3, 1919, lvi, No. 44, p. 1034) received röntgenotherapy for many years before a cure was finally realized.

DISEASES OF THE THYROID GLAND

The diagnosis of *hyperthyroidism,* which formerly rested upon purely clinical phenomena, has been recently rendered more exact by various tests and laboratory studies which should prove of the greatest practical value. The determination of basal metabolism by means of the clinical calorimeter has not only added to our method of diagnosis, but also provides an invaluable aid in the control of treatment. The apparatus employed for determining basal metabolism by McCaskey (*New York Med. Jour.,* October 11, 1919, cx, No. 15, p. 607; and *Jour. Amer. Med. Assoc.,* April 3, 1920, lxxiv, No. 14, p. 927) has been the Benedict portable respiration apparatus, while Snell, Ford and Rowntree (*Jour. Amer. Med. Assoc.,* August 21, 1920, lxxv, No. 8, p. 515) employed Tissot's spirometer, with

certain modifications introduced by Boothby and Sandiford, for the collection of air, and in its analysis Haldane's apparatus. The original portable apparatus has been modified by Benedict and Collins (*Bost. Med. and Surg. Jour.,* October 14, 1920, clxxxiii, No. 16, p. 449), and a simplified apparatus has been devised by Jones (*Jour. Amer. Med. Assoc.,* August 21, 1920, lxxv, No. 8, p. 538). The normal basal metabolism has been studied by Dreyer (*Lancet,* London, August 7, 1920, ii, No. 6, p. 289), who gives formulas for estimating the normal rate according to the size of the body and age of the person. In 182 cases of exophthalmic goitre observed by Sandiford (*Endocrinology,* Los Angeles, January–March, 1920, iv, No. 1, p. 71), before any treatment was instituted the average metabolic rate was plus 51 per cent., with an average pulse rate of 115; and in 154 patients with hyperthyroidism studied by Sturgis and Tompkins (*Arch. Intern. Med.,* Chicago, October, 1920, xxvi, No. 4, p. 467), there was a tachycardia of ninety or more to the minute associated with a basal metabolism of plus 15 per cent. or more in all but 16 per cent. Thirteen cases of hyperthyroidism reported by Snell, Ford and Rowntree (*Jour. Amer. Med. Assoc.,* August 21, 1920, lxxv, No. 8, p. 515) presented a basal metabolism rate ranging from plus twenty to plus eighty-two, the rates being approximately proportionate to the clinical evidence of thyroid intoxication. These findings form a striking contrast to the findings by these same writers in myxœdema and cretinism, where the metabolic rate varied from minus seven to minus thirty-two. A series of cases of hyperthyroidism under the care of Woodbury (*Jour. Amer. Med. Assoc.,* April 10, 1920, lxxiv, No. 15, p. 997), showed an increased metabolic rate, varying from 20 per cent. to 85 per cent., and all in whom it was thought safe to try the test showed a markedly positive epinephrin chlorid test. When a positive epinephrin response is elicited after a reasonable trial at rest-cure Goetsch (*New York State Jour. Med.,* September, 1920, xx, No. 9, p. 282) believes that in the absence of any other recognizable pathology the physician should think of a possible hyperthyroidism. The epinephrin test was applied by Troell (*Hygiea, Stockholm,* January 31, 1920, lxxxii, No. 2, p. 33) to a series of cases of exophthalmic goitre with findings confirming those reported by Goetsch. In a study of six cases the most convincing evidence in favor of a diagnosis of hyperthyroidism, Smith (*Jour. Amer. Med. Assoc.,* December 13, 1919,

lxxiii, No. 24, p. 1828) believes, was the response to thyroid feeding, there being also a suggestion of disturbed carbohydrate metabolism and a hypersensitiveness to epinephrin. He states that the value of the test for sugar tolerance in the early diagnosis of hyperthyroidism has not been definitely determined. The blood sugar tolerance test Wilson (*Jour. Lab. and Clin. Med.,* St. Louis, August, 1920, v, No. 11) has found of distinct importance in the early diagnosis of this disease.

A new serological test has been devised by Berkeley and Koopman (*Med. Rec.,* New York, June 19, 1920, xcvii, No. 25, p. 1035; and *Ohio State Med. Jour.,* Columbus, October 1, 1920, xvi, No. 10, p. 754), which they believe will prove of value for the clinical diagnosis of toxic thyroid states.

The clinical and röntgenological diagnosis of intrathoracic goitres has been described in detail by Schwyzer (*Jour. Amer. Med. Assoc.,* February 28, 1920, lxxiv, No. 9, p. 597) and Lahey (*Jour. Amer. Med. Assoc.,* July 17, 1920, lxxv, No. 3, p. 163), the most striking symptoms being those connected with interference with respiration, which in some cases may be extreme.

The great majority of cases of hyperthyroidism, Bram (*Endocrinology,* Los Angeles, October–December, 1919, iii, No. 4, p. 467) believes, may be completely and permanently cured by careful nonsurgical management. Subjective improvement and care in exophthalmic goitre from the employment of Röntgen rays is reported by Cotenot (*Méd.,* Paris, June, 1920, i, No. 9, p. 542), and routine irradiation of the thyroid and thymus, Means and Aub (*Arch. Intern. Med.,* Chicago, December 15, 1919, xxiv, No. 6, p. 645) consider the safest program for the treatment of these cases. Relief of symptoms in a patient with substernal goitre pressure symptoms is recorded by Rachford (*Amer. Jour. Med. Sci.,* September, 1920, clx, No. 3, p. 410) from rest, Röntgen ray, digitalis, and a capsule containing two and one-half grains of neutral bromide of quinine, one grain extract of ergot, and one-thirtieth grain extract of belladonna, three times a day for a long period of time. Certain cases, Juarros (*Plus-Ultra,* Madrid, September–October, 1919, iii, Nos. 15–16, p. 152) declares, are improved by the addition of ovarian to the antithyroid treatment, with calcium salts and sodium cacodylate as adjuvants; and Hoppe (*Ohio State Med. Jour.,* Columbus, October 1, 1920, xvi, No. 10,

p. 749) reports success from treatment with corpus luteum. Thymus treatment is preferred by Blondel (*Bull. de l'Acad. de Med.*, Paris, October 14, 1919, lxxxii, No. 31, p. 185), and Sheehan and Newcomb (*Jour. Amer. Med. Assoc.*, January 10, 1920, lxxiv, No. 2, p. 81) report relief of thyrotoxicosis in the graver forms of goitre from injections of a mixture of equal parts of phenol, tincture of iodin and glycerin.

DIABETES INSIPIDUS

This condition Bauer and Aschner (*Wien. Arch. für in. Med.*, Vienna, June 1, 1920, i, No. 2, p. 297) believe due to changes in the nerve centres of the floor of the fourth ventricle (the largest group), to some primary disturbance of the centres for thirst perception and diuresis, or psychogenous in origin. They believe abnormal conditions in the pituitary have not been established as a cause, although they are a possibility. The relation between diabetes and acromegaly has been studied by Pittaluga (*Siglo Méd.*, Madrid, February 7, 1920, lxvii, No. 3452, p. 90) and Lereboullet (*Prog. Med.*, Paris, March 6, 1920, xxxv, No. 10, p. 106); and Strauss (*Deut. med. Woch.*, Berlin, August 19, 1920, xlvi, No. 34, p. 939) reports an interesting combination of diabetes insipidus and myxœdema.

Favorable results from the use of pituitary extract in diabetes insipidus are constantly being recorded (Flandin and others, *Bull. de la Soc. Méd. des Hôp.*, Paris, April 16, 1920, xliv, No. 13, p. 487; Lereboullet, *Paris Méd.*, November 1, 1919, ix, No. 44, p. 353; Pagniez, *Presse Méd.*, Paris, December 6, 1919, xxvii, No. 74, p. 746; Nasso, *Pediatria*, Naples, September 1, 1920, xxviii, No. 17, p. 812; and Koopman, *Endocrin.*, Los Angeles, October–December, 1919, iii, No. 4, p. 485); and Cammidge (*Pract.*, London, October, 1920, cv, No. 4, p. 244) reports a case with recovery following lumbar puncture.

DIABETES MELLITUS

An interesting survey of the prevalence of diabetes has been made by Hoogslag (*Nederl. Tijd. v. Geneesk.*, Amsterdam, January 24, 1920, i, No. 4, p. 295), who urges the necessity of regular repeated urine examinations for the early detection and prevention of the disease. The decrease in diabetes as the result of war conditions, probably due to diet restrictions, has been commented upon by Magnus-

Levy (*Deut. med. Woch.*, Berlin, December 11, 1919, xlv, No. 50, p. 1379) and Gerhardt (*Schweiz. med. Woch.*, Basel, February 19, 1920, l, No. 8, p. 141).

The relation of the pancreas to the development of diabetes has been demonstrated by numerous animal experiments, most of the observers being of the opinion that the essential factor is a component of the internal secretion of the pancreas, probably in the nature of a substance which exerts a restraining influence upon the glycolytic ferment of the liver (Cammidge, *Lancet*, London, August 21, 1920, ii, No. 8, p. 393; Ross and Davis, *Amer. Jour. Phys.*, Baltimore, October, 1920, liii, No. 3, p. 391; Southard, *Jour. Lab. and Clin. Med.*, St. Louis, December, 1919, v, No. 3, p. 139; Delatour, *Arch. Intern. Med.*, Chicago, April 15, 1920, xxv, No. 4, p. 405; and Langfeldt, *Acta Med. Scand.*, Stockholm, March 6, 1920, liii, No. 1, p. 1). Considerable interest is attached to the observation of Apolloni (*Policlin.*, Rome, April 26, 1920, xxvii, No. 17, p. 482), who describes a patient presenting symptoms of diabetes for a year in which the pancreas was found with nothing left but a shell containing sand and calculi, and to the case reported by Carnot and Harvier (*Paris Méd.*, May 15, 1920, x, No. 20, p. 401; and *Bull. de la Soc. Méd. des Hôp.*, Paris, January 16, 1920, xliv, No. 2, p. 71) in which syphilitic changes in the pancreas were responsible for the diabetes.

The following grouping of cases of *glycosuria* has been suggested by Brown (*Brit. Med. Jour.*, London, August 7, 1920, ii, No. 3110, p. 191): (1) Organic origin with structural changes in the endocrine glands leading to (*a*) overaction of suprarenal, thyroid, pituitary, or (*b*) underaction of the pancreas. (2) Sympathetic origin, with no evidence of structural changes in any endocrine gland, but producing a functional (*a*) overaction of suprarenal, thyroid, pituitary, or (*b*) underaction of pancreas. The relation of the thyroid to glycosuria has been studied by Rohdenburg (*Endocrinol.*, Los Angeles, January–March, 1920, iv, No. 1, p. 63) and by Labbé (*Bull. de la Soc. Méd. des Hôp.*, Paris, November 14, 1919, xliii, No. 32, p. 955; and *Annales de Méd.*, Paris, 1920, vii, No. 2, p. 95); and of the suprarenals by Fujii (*Tohoku Jour. of Exper. Med.*, Sendai, April 29, 1920, i, No. 1, p. 38).

The clinical application of the findings obtained by a study of sugar content of the blood has been attracting considerable attention,

although the interpretation of the findings by various observers do not harmonize completely. A diminished renal permeability for glucose, in the sense of a raised threshold according to tests with Benedict's copper solution, Allen and Wishart (*Jour. Biol. Chem.,* Baltimore, August, 1920, xliii, No. 1, p. 129) have found the rule in diabetic animals. In the normal Chabanier and Lebert (*Presse Méd.,* Paris, August 14, 1920, xxviii, No. 57, p. 553) found the threshold well below 3 : 1000; the figures being generally lower than that of the glycæmia, but very close to it. They emphasize the fact that the glucose threshold is no criterion of the existence or the gravity of the diabetes in any case. A study of more than 700 cases of diabetes by Cammidge (*Pract.,* London, February, 1920, civ, No. 2, p. 114) has shown that there is no constant blood sugar level for the appearance of sugar in the urine in quantities recognizable by ordinary tests. When the threshold fluctuates readily, Rathery (*Médecine,* Paris, July, 1920, i, No. 10, p. 593; and *Paris Méd.,* May 1, 1920, x, No. 18, p. 372) believes the glycosuria can usually be kept under control by dieting; otherwise not.

The important information to be derived from the fluctuations in the individual threshold for sugar in the blood is also commented upon by Bierry (*Médecine,* Paris, September, 1920, i, No. 12, p. 733).

The behavior or "reaction" of the blood sugar in response to a definite uniform test meal, Hahn and Offenbacher (*Deut. med. Woch.,* Berlin, November 20, 1919, xlv, No. 47, p. 1298) consider of great practical value. They give up to 0.11 per cent. blood sugar as the normal figure, fasting; values from 0.12–0.16 per cent. they designate as slightly above normal or suspicious, and a sugar content of more than 0.16 they characterize as pathologically hyperglycæmic. The range, fasting, in the healthy Japanese, Sakaguchi (*Mitteil. aus der med. Fak. der Univ. zu Tokyo,* October 11, 1918, xx, No. 3) found to be between 0.067 and 0.107, with an average of 0.088; he has also studied the diurnal variation, the effect of emotional stress and the influence of intake of albumin on the sugar content of the blood (*Mitteil. aus der med. Fak. d. kais. Univ.,* Tokio, December 28, 1918, xx, No. 4, p. 439).

A marked reduction in the sugar content of the blood in healthy persons after physical exertion leading to rapid fatigue, has been

noted by Brösamlen and Sterkel (*Deut. Arch. klin. Med.,* Leipzig, October 24, 1919, cxxx, Nos. 5–6, p. 358).

A study of four different technics for determining the sugar content of the blood has been made by Høst and Hatlehol (*Norsk. Mag. for Laegiv.,* Christiania, Septeber, 1920, lxxxi, No. 9, p. 877), who found the normal level to be about 0.11 per cent. with the Bang, Hagedorn and Folin tests, but the Myers and Bailey modification of the Lewis and Benedict method occasionally gave higher figures, up to 0.142 in one instance.

A microchemical method, based on the Folin and Wu method, has been described by Wallis and Gallagher (*Lancet,* London, October 16, 1920, ii, No. 5068, p. 784), and Folin and Wu (*Jour. Biol. Chem.,* Baltimore, March, 1919, xli, No. 3, p. 367) publish a simplification and improvement of their technic for estimating blood sugar.

The various failures of dietetic treatment and their causes have been studied by Allen (*Jour. Exper. Med.,* Baltimore, May 1, 1920, xxxi, No. 5, p. 587) in experimental animals in which he was able to produce every detail of the downward progress of human patients on various diets. The assumption that the hyperglycæmia and the glycosuria in diabetes are due to an overproduction of sugar from albumin and fat, Geelmuyden (*Norsk. Mag. for Laeg.,* Christiania, June, 1920, lxxxi, No. 6, p. 578) believes, offers a plausible explanation for the phenomena in diabetes. He has also tabulated the necropsy findings in ten diabetics and in four nondiabetics in regard to the weight of the liver and its content in glycogen and fat, and the fat content of the blood (*Acta Med. Scand.,* Stockholm, June 9, 1920, liii, No. 4, p. 381). The importance of keeping the protein intake at a low level is emphasized by Labbé (*Médecine,* Paris, July, 1920, i, No. 10, p. 590) and Fenlon (*Bost. Med. and Surg. Jour.,* February 12, 1920, clxxxii, No. 7, p. 168) in the prevention of acidosis.

The effects of carbohydrate diets have been studied by Allen (*Jour. Exper. Med.,* Baltimore, April 1, 1920, xxxi, No. 4, p. 381) in partially depancreatized animals, and on the basis of his experiments he states that even if a patient becomes free from glycosuria on withdrawal of sugar only, nevertheless other foods should also be limited. He noted no significant differences between the assimilation of different starches, or any extreme lowering of the carbohydrate tolerance by proteins.

An interesting comparison of the Allen and Joslin methods of treatment has been made by Craver (*U. S. Naval Med. Bull.*, Washington, D. C., July, 1920, xiv, No. 3, p. 345) in two cases, and most encouraging results have been obtained by Hoogslag (*Nederl. Tijd. v. Geneesk.*, Amsterdam, January 24, 1920, i, No. 4, p. 295) by the Allen-Joslin fasting method of treatment. The general treatment of these cases has been described in detail by Williamson (*Brit. Med. Jour.*, London, March 20, 1920, i, No. 3090, p. 399) and Strouse (*Jour. Amer. Med. Assoc.*, July 10, 1920, lxxv, No. 2, p. 97). An interesting and important study of the carbohydrate content of the various thrice-boiled vegetables has been made by Cammidge (*Lancet*, London, December 27, 1919, ii, No. 5026, p. 1192), which is of considerable practical value. A lowering of the blood sugar in experimental diabetes from the intravenous injection of unfiltered watery extracts of fresh pancreas, causes Kleiner (*Jour. Biol. Chem.*, Baltimore, November, 1919, xl, No. 1, p. 153) to believe that further study may indicate a possible therapeutic application in human beings. If a special susceptibility to albumin is discovered in the diabetic, Koopman (*Nederl. Tijd. v. Geneesk.*, Amsterdam, October 11, 1919, ii, No. 15, p. 1071) believes the pituitary should be thought of, as he has observed two such cases that responded to pituitary treatments. The treatment of combined diabetes and nephritis has been studied by Allen, Mitchell and Sherrill (*Jour. Amer. Med. Assoc.*, August 14, 1920, lxxv, No. 7, p. 444), obtaining results which they consider encouraging. The various forms of albuminuria which may be combined with diabetes have been described by Weil (*Berl. klin. Woch.*, Berlin, November 3, 1919, lvi, No. 44, p. 1037).

RENAL GLYCOSURIA

An increasing number of cases have been recorded showing the presence of glycosuria, normal sugar content of the blood, and with the tissues of the body retaining their power to utilize carbohydrates in a normal way. Whether these cases are increasing in number is questionable, but the field opened up by the study of the blood sugar has enabled us to more definitely recognize this "harmless diabetes" (Paullin, *Jour. Amer. Med. Assoc.*, July 24, 1920, lxxv, No. 4, p. 214; Wynhausen and Elzas, *Arch. für Verd.-Krankh.*, Berlin, 1920, xxvi, Nos. 1–2, p. 33; Allen, Wishart and Smith, *Arch. Intern. Med.*,

Chicago, November 15, 1919, xxiv, No. 5, p. 523; and Galambos, *Deut. med. Woch.,* Berlin, May 27, 1920, xlvi, No. 22, p. 600).

NEPHRITIS

The *etiology* of nephritis is a subject which receives relatively scant attention from investigators in spite of its importance. To the list of possible causes Thompson and McCauley (*Lancet,* London, February 28, 1920, i, No. 9, p. 481) have added influenza, as they believe nephritis a more frequent complication than has been generally recognized. That nephritis may be of intestinal origin is the opinion of Lemierre (*Médecine,* Paris, March, 1920, i, No. 6, p. 361) and Heitz-Boyer (*Bull. de la Soc. Méd. des Hôp.,* Paris, October 17, 1919, xliii, No. 28, p. 815), while Thompson (*Jour. Amer. Med. Assoc.,* July 3, 1920, lxxv, No. 1, p. 17) believes syphilis is more frequently the cause than would be indicated by writers on this subject, and Hill (*Jour. Amer. Med. Assoc.,* December 6, 1919, lxxiii, No. 23, p. 1747) considers tonsillitis is one of the most frequent causes.

The importance of recognizing the type of nephritis is insisted upon by Hélouin (*Bull. de la Soc. Méd. des Hôp.,* Paris, October 24, 1919, xliii, No. 29, p. 889), who lists nine types. Among ninety cases of nephritis studied postmortem by Fitz (*Bost. Med. and Surg. Jour.,* August 26, 1920, clxxxiii, No. 9, p. 247), all but seven were chronic glomerulonephritis or arteriosclerotic nephritis. That nephritis is essentially a vascular disease is the opinion of Moschcowitz (*Arch. Intern. Med.,* Chicago, September 15, 1920, xxvi, No. 3, p. 259; and *Amer. Jour. Med. Sci.,* Philadelphia, November, 1919, clviii, No. 572, p. 668), who submits a classification of chronic nephritis based on his studies.

The creatinuria of infancy has been carefully studied by Gamble and Goldschmidt (*Jour. Biol. Chem.,* Baltimore, November, 1919, xl., No. 1, pp. 199 and 215), who suggest that preformed creatin in milk modifications may prove to be a large factor in the production of this condition.

An excess of indican in the blood serum van Vloten (*Nederl. Tijd. v. Geneesk.,* Amsterdam, August 14, 1920, ii, No. 7, p. 585) considers of grave prognostic significance even in cases in which there may be a decline in the urea content of the serum, the technic of the method for its determination being described by Snapper and van

Vloten (*Nederl. Tijd. v. Geneesk.*, Amsterdam, July 10, 1920, ii, No. 2, p. 136). Blood phosphate retention was noted by Denis and Minot (*Arch. Intern. Med.*, Chicago, July, 1920, xxvi, No. 1, p. 99) in 65 per cent. of the nephritic and cardiorenal cases they studied.

The urea content of the blood is believed by Vallery-Radot (*Médecine*, Paris, March, 1920, i, No. 6, p. 368) to provide one of the most important prognostic indications we possess, a constant finding of over 1 gm. per litre being of grave significance regardless of the general condition of the patient. The significance of the urea content of the blood, its relation to total blood nitrogen in nephritis and uremia has been studied by Umber and Rosenberg (*Acta Med. Scand.*, Stockholm, August 31, 1920, liii, No. 5, p. 523), Barlocco (*Rif. Med.*, Naples, November 15, 1919, xxxv, No. 46, p. 1003), Chabanier and de Castro Galhardo (*Presse Méd.*, Paris, September 18, 1920, xxviii, No. 67, p. 653), Venza (*Annali di Clin. Med.*, Palermo, October, 1919, ix, No. 4, p. 66); Chapin and Myers (*Amer. Jour. Dis. Child.*, December, 1919, xviii, No. 6, p. 555) regard the test as especially helpful in prognosis in children; they also noted that nephritis in children does not so readily result in urea retention as in adults. The technic of the estimation of urea in the blood with the urease test is described by Bahlmann (*Nederl. Tijd. v. Geneesk.*, Amsterdam, February 7, 1920, i, No. 6, p. 473) and a rapid, accurate bedside method of determination has been published by Steinfield (*Jour. Amer. Med. Assoc.*, August 14, 1920, lxxv, No. 7, p. 473).

The determination of the elimination of water, chlorid and of nitrogen by the kidney has no practical value unless the intake of each for three or four days beforehand is known, and the amount of urine voided for three or four days previously, according to Génévrier (*Bull. Méd.*, Paris, May 12, 1920, xxxiv, No. 25, p. 438). Care must be used in interpreting the results of water elimination tests, as Siebeck (*Deut. Arch. für klin. Med.*, Leipzig, January 27, 1919, cxxviii, Nos. 3–4, p. 173) believes this is not entirely dependent upon kidney function. A type of nephritis is described by Hélouin (*Bull. de la Soc. Méd. des Hôp.*, Paris, October 24, 1919, xliii, No. 29, p. 893) characterized by retention of chlorids and urea but not of water, which he terms "chloroazotemic nephritis."

The color of the urine may definitely influence the readings in the phenolsulphonephthalein test, according to Pedersen (*New York*

Med. Jour., October 2, 1920, cxii, No. 14, p. 477), who maintains that in all the ordinary scale readings 10 per cent. should be deducted for pale yellow, 15 per cent. for positive yellow, and 20 per cent. for urine with a reddish or orange tinge, in order to arrive at the absolute excretion. Two standards are used by Reinle and DePuy (*Calif. State Jour. Med.,* San Francisco, February, 1920, xviii, No. 2, p. 49) in each determination, which they believe solves the problem of matching colors. The ability of the kidneys to pass off the waste products of metabolism, Blodget (*New York Med. Jour.,* October 2, 1920, cxii, No. 14, p. 483) is convinced, is not shown by any of the so-called kidney tests in many cases; he employs the feeding of definite amounts of nitrogenous foods to a person previously put on a so-called basic diet and watching the output of urea. That proteinuria is not an indication of defective function of the kidney is the belief of MacLean and Wesselow (*Brit. Jour. Exper. Path.,* London, February, 1920, i, No. 1, p. 53) unless supported by other efficiency tests. They consider the " administration of urea " test better than others now in use.

The treatment of nephritis possesses certain defects, but we can do much to improve the condition of the nephritic, and probably can retard the progress of the lesion we cannot cure, as Christian (*Jour. Amer. Med. Assoc.,* June 12, 1920, lxxiv, No. 24, p. 1615) has pointed out. The most important measure is a careful regulation of the diet, based on the results of functional tests (Motzfeldt, *Norsk. Mag. for Laeg.,* Christiania, January, 1920, lxxxi, No. 1, p. 13), a diet poor in protein and poor in salt being recommended by Christian (*South. Med. Jour.,* Birmingham, Ala., August, 1920, xiii, No. 8, p. 545). In parenchymatous cases in which there is no nitrogenous retention, MacLean and Russell (*Lancet,* London, June 19, 1920, i, No. 5051, p. 1305) see no objection to giving protein, and even in interstitial nephritis they believe in a fairly liberal diet. In the treatment of mild chronic nephritis in children Hill (*Jour. Amer. Med. Assoc.,* August 28, 1920, lxxv, No. 9, p. 596) believes it a mistake to restrict the diet too closely, although he is opposed to allowing an unrestricted diet.

Favorable results in the treatment of nephritis, Hülse (*Zentr. für innere Med.,* Leipzig, June 19, 1920, xli, No. 25, p. 441) has noted, from the use of calcium chloride, and Niles (*Jour. Amer. Med. Assoc.,*

December 27, 1919, lxxiii, No. 26, p. 1933) has published some suggestions for alleviating the distressing disturbances in cardiorenal disease. In nephritis with uremia Rathery and Boucheron (*Paris Méd.*, July 17, 1920, x, No. 29, p. 56; and *Bull. de la Soc. Méd. des Hôp.*, Paris, January 16, 1920, xliv, No. 2, p. 61) warn against employing hypertonic sugar solution as they found the condition aggravated by its use.

CARDIAC DISEASE

Auricular fibrillation may be transient or paroxysmal, according to Mason (*Bull. Johns Hopkins Hosp.*, Baltimore, May, 1920, xxxi, No. 3511, p. 145), and Arias (*Cronica Med.*, Lima, Peru, October, 1919, xxxvi, No. 676, p. 350) believes that it may at times be of nervous origin, a view which would explain why certain patients maintain a good general condition in spite of their cardiac disability. An analysis of five hundred cases by Willius (*Minn. Med.*, St. Louis, August, 1920, iii, No. 8, p. 365) emphasizes the grave significance of fibrillation in patients suffering from heart disease, the mortality doubling or even trebling in some groups.

The irregular arrhythmias have been studied by Lutembacher (*Paris Med.*, July 31, 1920, x, No. 31, p. 91), who believes that the term "total arrhythmia" should be reserved for the complicated forms of complete arrhythmia, as in these cases all the properties of the heart are altered. Sinus arrhythmia in children, Farr (*New York Med. Jour.*, October 18, 1919, cx, No. 16, p. 637) believes, has no pathologic significance, and he considers heart block the most important pathologic disturbance of the heart beat in children with diphtheria. A case of heart block in a child of two years, associated with acute nasal and throat infection, is reported by Eyster and Middleton (*Amer. Jour. Dis. Child.*, February, 1920, xix, No. 2, p. 131). A complete study of the arrhythmias and their appropriate treatment has been published by Barlaro (*Prensa Méd. Argent.*, Buenos Aires, January 10, 1920, vi, No. 22, p. 231), the value of quinine in the prevention and treatment of auricular fibrillation being emphasized by Schrumpf (*Presse Méd.*, Paris, July 31, 1920, xxviii, No. 53, p. 524).

The numerous measures which may be employed to arrest by reflex action the paroxysms of tachycardia have been enumerated by Chevallier (*Bull. Med.*, Paris, April 28, 1920, xxxiv, No. 23, p. 395)

and Donzelot (*Médecine,* Paris, March, 1920, i, No. 6, p. 379), the latter also outlining the general treatment for this group of cases.

Every patient with cardiac decompensation who has neither aortic insufficiency nor stenosis, nor mitral stenosis, Wilson (*Missouri State Med. Assoc. Jour.,* St. Louis, October, 1920, xvii, No. 10, p. 403) believes, may be looked upon as a case of chronic myocarditis. Less marked symptoms of insufficiency in patients past middle life are to be viewed as myocardial, but such a diagnosis in the young on symptoms alone is not justifiable.

Treatment.—The question of treatment naturally centres in digitalis, although Krehl (*Deut. Arch. für klin. Med.,* Leipzig, January 27, 1919, cxxviii, Nos. 3–4, p. 165) remarks on the importance of trying to secure the desired results without this drug if possible, and Pfalz (*Deut. med. Woch.,* Berlin, October 23, 1919, xlv, No. 43, p. 1181) notes a relief of subjective symptoms in various heart diseases from infusion of glucose solution. That chloral is of value in cardiovascular disease is the opinion of Glaus (*Schw. med. Woch.,* Basel, September 16, 1920, l, No. 38, p. 841) for the relief of insomnia.

The importance of fresh active preparations of cardiac stimulants is again emphasized by Zueblin (*Med. Rec.,* New York, January 3, 1920, xcvii, No. 1, p. 16), and West and Pratt (*Jour. Amer. Med. Assoc.,* July 10, 1920, lxxv, No. 2, p. 77) have described their clinical experience with a standardized dried aqueous extract of *digitalis.* A pharmacological study has been made of a chloroform extractive of digitalis by Hatcher (*Jour. Amer. Med. Assoc.,* August 14, 1920, lxxv, No. 7, p. 460), which Eggleston (*Jour. Amer. Med. Assoc.,* August 14, 1920, lxxv, No. 7, p. 463) believes compares favorably with the best tinctures as far as rapidity of absorption is concerned. The rate of absorption of digitalis has been studied by Pardee (*Jour. Amer. Med. Assoc.,* November 6, 1920, lxxv, No. 19, p. 1258), who states that the full effect is not obtained until six hours after its administration.

The method for administering digitalis to obtain quick therapeutic effect has been outlined by Eggleston (*Jour. Amer. Med. Assoc.,* March 13, 1920, lxxiv, No. 11, p. 733), Robinson (*South. Med. Jour.,* Birmingham, June, 1920, xiii, No. 6, p. 396) and Pardee (*New York Med. Jour.,* December 27, 1919, cx, No. 26, p. 1064). A

combination of the Eggleston and Robinson methods is advocated by Warfield (*Wisconsin Med. Jour.*, Milwaukee, October, 1920, xix, No. 5, p. 235). The employment of digitalis has been studied experimentally by Levine and Cunningham (*Arch. Intern. Med.*, Chicago, September 15, 1920, xxvi, No. 3, p. 293), and Mory (*Münch. med. Woch.*, Munich, May 14, 1920, lxvii, No. 20, p. 570) claims that strophanthin may be given intravenously with perfect safety if the dose is carefully adjusted and slowly injected one drop at a time.

No report on the treatment of cardiac disease would be complete without some reference to the excellent work that is being carried out in an effort to make the chronic cardiac patient self-supporting, as described by St. Lawrence and Adams (*Hosp. Soc. Serv. Quart.*, 2: 151, May, 1920), Duggan (*Hosp. Soc. Serv. Quart.*, 2: 227, May, 1920), and Hardt and Beckley (*Jour. Amer. Med. Assoc.*, December 6, 1919, lxxiii, No. 23, p. 1792).

BLOOD-PRESSURE

The accurate determination of the pressure within the capillaries would undoubtedly add a great deal to our understanding of the physiology and pathology of the circulation, and it will be interesting to observe whether the microcapillary tonometer of Danzer and Hooker (*Amer. Jour. Phys.*, Baltimore, May 1, 1920, lii, No. 1, p. 136) will prove all that its inventors claim. One interesting observation they have made from their studies with this instrument is that the redness of the skin is not due to the capillaries themselves but to the venous plexuses. A simple apparatus for determining capillary blood-pressure has also been devised by Kylin (*Zentralb. für innere Medizin*, Leipzig, July 17, 1920, xli, No. 29, p. 512).

The studies made of the blood-pressure employing the Pachon's oscillometer (Mougeot, *Arch. des Mal. du Coeur, etc.*, Paris, June, 1919, xii, No. 6, p. 250; Villaret and Dufour, *Bull. de la Soc. Méd. des Hôp.*, Paris, November 28, 1919, xliii, No. 34, p. 1006; and May, *Presse Med.*, Paris, June 26, 1920, xxviii, No. 43, p. 423) indicate that this method possesses certain advantages. An interesting statistical study of the blood-pressure has been made by Alvarez (*Arch. Intern. Med.*, Chicago, October, 1920, xxvi, No. 4, p. 381) from which he believes that one may discover in youth changes in pressure which indicate beginning cardiovascular disease.

A simple method for obtaining continuous blood-pressure tracings in man has been devised by Kolis (*Jour. Pharm. and Exper. Therap.*, Baltimore, July, 1920, xv, No. 5, p. 433), and interesting observations have been made by Tixier (*Arch. des Mal. du Coeur.*, etc., Paris, August, 1919, xii, No. 8, p. 337) on the variations of blood-pressure during prolonged examination, by Kahn (*Amer. Jour. Med. Sci.*, Philadelphia, December, 1919, clviii, No. 6, p. 823) and Sewall (*Amer. Jour. Med. Sci.*, Philadelphia, December, 1919, clviii, No. 6, p. 786) on the significance of postural changes, and by Dawson and Hodges (*Amer. Jour. Physiol.*, Baltimore, January 1, 1920, l, No. 4, p. 481) on the effect of strain upon the blood-pressure.

The importance of a knowledge of the volume of the pulse in the study of the blood-pressure is insisted upon by Sahli (*Schw. med. Woch.*, Basel, January 1, 1920, l, No. 1, p. 2), who describes a simple apparatus for the determination of the pulse volume. The heart beat volume of blood has also been estimated by Wiedemann (*Deut. Arch. für klin. Med.*, Leipzig, July 5, 1919, cxxix, Nos. 5–6, p. 325), who employs a simple device for determining the fluctuations of the pressure in the air passages in the lungs, synchronous with the heart beat.

Arterial Hypertension.—A small series of interesting experiments have been carried out on patients with arterial hypertension by Allen (*Jour. Amer. Med. Assoc.*, March 6, 1920, lxxiv, No. 10, p. 652), with regard to the salt tolerance, restriction of water, and the dietetic treatment. The relationship between arterial hypertension and endocrine dyscrasia has been studied by Engelbach (*Jour. Amer. Med. Assoc.*, June 12, 1920, lxxiv, No. 24, p. 1619), who believes there is a definite type of this condition closely associated with disturbed internal secretion.

The futility of medicinal treatment of this condition is emphasized by Vaquez (*Anales de la Facult. de Med.*, Montevideo, July–August, 1919, iv, Nos. 7–8, p. 421) and Musser (*New York Med. Jour.*, October 16, 1920, cxii, No. 16, p. 570), the latter believing that the reduction of salt and water intake forms a valuable adjuvant to the physical and hygienic measures employed. The dietetic treatment of this condition Moschcowitz (*Amer. Jour. Med. Sci.*, Philadelphia, April, 1920, clix, No. 4, p. 517) considers one of our most important methods of controlling hypertension, and Hopkins (*New York Med. Jour.*, December 6, 1919, cx, No. 23, p. 930) has de-

scribed in detail the appropriate treatment for each stage of climateric hypertension. The action of benzyl benzoate in hypertension has been studied by Macht (*New York Med. Jour.,* August 28, 1920, cxii, No. 9, p. 269), who considers it a more reliable vaso-dilator than the nitrites.

ARTERIOSCLEROSIS

Clinical arteriosclerosis, according to Norris (*Amer. Jour. Med. Sci.,* Philadelphia, June, 1920, clix, No. 6, p. 815) may be simply an evolution process, a part and parcel of aging; or it may be mechanical or toxic in origin. Arterial changes resulting from nicotin poisoning have been observed by Beneke (*Münch. med. Woch.,* Munich, December 19, 1919, lxvi, No. 51, p. 1463) in three cases, and experiments have been conducted by Newburgh and Squier (*Arch. Intern. Med.,* Chicago, July, 1920, xxvi, No. 1, p. 38), which indicate that a high protein diet is capable of producing arteriosclerosis in rabbits, either directly or indirectly.

ANGINA PECTORIS

An electrocardiographic sign has been described by Pardee (*Arch. Intern. Med.,* Chicago, August 15, 1920, xxvi, No. 2, p. 244), which he considers characteristic of coronary artery obstruction, and three cases of coronary artery thrombosis with tachycardia have been studied by Herrmann (*Missouri State Med. Assoc. Jour.,* St. Louis, October, 1920, xvii, No. 10, p. 406). In the presence of myocardial insufficiency, and particularly auricular fibrillation, flutter or alternation, Gordinier (*Med. Rec.,* New York, October 4, 1919, xcvi, No. 14, p. 575) lays stress on the value of digitalis, as does also Gallavardin (*Médecine,* Paris, March, 1920, i, No. 6, p. 344), who advises antisyphilitic treatment on the faintest suspicion of syphilis. The treatment of this condition between and during attacks is described in detail by Martinet (*Presse Méd.,* Paris, February 25, xxviii, No. 16, p. 153).

ANEURISM

An interesting case of aneurism of the aorta has been reported by Crance (*Mich. State Med. Soc. Jour.,* Grand Rapids, March, 1920, xix, No. 3, p. 120) in which there was a decided difference in the blood-pressure of both arms. Four cases of aneurism have been

studied by Manouélian (*Bull. de la Soc. Méd. des Hôp.,* Paris, May 28, 1920, xliii, No. 19, p. 742) in three of which spirochæta pallida were found, and Maclachlan (*Amer. Jour. Med. Sci.,* Philadelphia, April, 1920, clix, No. 4, p. 525) lays stress on antisyphilitic treatment in these cases. Marked improvement followed wiring in the case so treated by Tagliavacche (*Prensa Méd. Argent.,* Buenos Aires, November 30, 1919, vi, No. 18, p. 189), and Hare (*Jour. Amer. Med. Assoc.,* December 20, 1919, lxxiii, No. 25, p. 1865) reports the results of wiring and electrolysis in three more cases of aneurism, bringing his list up to thirty in all.

AORTITIS

One hundred aortas were studied by Lemann and Mattes (*South. Med. Jour.,* Birmingham, Alabama, September, 1920, xiii, No. 9, p. 623) only nine of which appeared to have a smooth intima, three of these showing syphilitic changes microscopically. Thus only six were normal, and of the six five were children below the age of ten, leaving one adult (twenty years old)with a normal aorta. Aneurism and aortitis, associated with bacteræmia and septicæmia have been reported by Merke (*Schw. med. Woch.,* Basel, February 12, 1920, l, No. 7, p. 122) and Greiwe (*Ohio State Med. Jour.,* Columbus, March 1, 1920, xvi, No. 3, p. 151).

The diagnosis of aortitis is of the greatest importance, and it is unfortunate that we have come to rely to such an extent upon the X-ray and the blood test in determining its presence. The clinical diagnosis of aortitis has been fully described by Pontano (*Policlinico,* Rome, September 28, 1919, xxvi, No. 39, p. 1129) and by Hoover (*Jour. Amer. Med. Assoc.,* January 24, 1920, lxxiv, No. 4, p. 226), the latter believing that incipient syphilitic aortitis may be recognized without the aid of the Röntgen ray, Wassermann reaction and the spirochæta pallida, although they may be employed to confirm the clinician's findings. The clinical findings have also been described by Hubert (*Münch. med. Woch.,* Munich, December 12, 1919, lxvi, No. 50, p. 1436), although he considers the röntgenologic findings the most important. A study of the Röntgen-ray examination of the great vessels has been published by Martin (*Jour. Amer. Med. Assoc.,* March 13, 1920, lxxiv, No. 11, p. 723), and Mougeot and Pacaud (*Paris Méd.,* November 8, 1919, ix, No. 45, p. 374).

Antisyphilitic treatment of the heart and blood-vessels has been very fully described by Mackenzie (*Glasgow Med. Jour.,* November, 1919, x, No. 5, p. 209), Hubert (*Deut. Arch. für. klin. Med.,* Leipzig, February 18, 1919, cxxviii, Nos. 5–6, p. 317) and Muller-Deham (*Wien. klin. Woch.,* Vienna, January 22, 1920, xxxiii, No. 4, p. 77).

DISEASES OF THE STOMACH

The *gastric secretion* is believed by Hernando (*Med. Ibera,* Madrid, October 11, 1919, ix, No. 101, p. 23) and Boenheim (*Arch. für Verd. Krankh.,* Berlin, 1920, xxvi, Nos. 1–2, p. 74) to be definitely influenced by the glands with internal secretion, while Luckhardt, Kecton, Koch and La Mer (*Amer. Jour. Phys.,* Baltimore, January 1, 1920, l, No. 4, p. 527) suggest that there are two classes of bodies causing gastric secretion, but whether they are extractives from special tissues or hydrolytic cleavage products has not been determined. The gastric response to various foods has been studied by Miller, Bergeim, Rehfuss and Hawk, and also the psychic secretion in normal man (*Amer. Jour. Phys.,* Baltimore, May 1, 1920, lii, No. 1, p. 1), covering response to vegetables prepared in different ways (*Amer. Jour. Phys.,* Baltimore, March 1, 1920, li, No. 52, p. 332), sugar and candies (*Amer. Jour. Phys.,* Baltimore, August, 1920, liii, No. 1, p. 65) and tea, coffee and cocoa (*Amer. Jour. Phys.,* Baltimore, May 1, 1920, lii, No. 1, p. 28).

The experiences of Sáenz (*Siglo Méd.,* Madrid, May 1, 1920, lxvii, No. 3464, p. 321) with the fractional analysis of the stomach contents have appeared during the past year, and Rehfuss and Hawk (*Jour. Amer. Med. Assoc.,* August 14, 1920, lxxv, No. 7, p. 449) have contributed an article on this method of study based on their very extensive experience. They state that the fractional analysis of a test meal is an exact determination of the secretory and motor function, and the results of these two studies can demonstrate only alterations of function, whether their origin is functional or organic, and that a thorough knowledge of the normal output is essential for the interpretation of the findings. That the hard-boiled egg test meal provides information in regard to various gastric pathologic conditions not obtainable in any other way is the belief of Rodella (*Corresp.-Blatt für Schw. Aerzte,* Basel, October 23, 1919, xlix, No. 43, p.

1623), while Pron (*Bull. de l'Acad. de Méd.,* Paris, April 20, 1920, lxxxiii, No. 16, p. 361; and *Presse Méd.,* Paris, June 12, 1920, xxviii, No. 39, p. 381) emphasizes the diagnostic value of the analysis of the content of the fasting stomach. The error resulting from the assumption that the stomach contents obtained after a test meal represents pure gastric secretion, Baufle (*Paris Méd.,* November 29, 1919, ix, No. 48, p. 428) believes may be corrected by the addition of ferric sulphate to the test meal, thus producing a means of estimating the proportion of the meal remaining in the gastric contents.

The etiology of *gastric ulcer* is still a problem which attracts considerable attention, being the subject of numerous studies and investigations. The anatomic arrangement of the arteries of the stomach is believed by Reeves (*Surg., Gynec. and Obstet.,* Chicago, April, 1920, xxx, No. 4, p. 374) to play a part in the etiology of ulcer, while Nicolaysen (*Norsk. Mag. for Laeg.,* Christiania, March, 1920, lxxxi, No. 3, p. 225) relates that vagus stimulation can induce erosion of the stomach, but whether they are always due to this is uncertain. Endocrine factors as a cause have been investigated by Silvestri (*Policlinico,* Rome, June 28, 1920, xxvii, No. 26, p. 673). An intensive study of 522 gastric ulcers has convinced Smithies (*Jour. Amer. Med. Assoc.,* June 5, 1920, lxxiv, No. 23, p. 1555) that this lesion is not due to a local gastric disease but is only the local manifestation of a sytemic disturbance, initiated by a great variety of agents.

In the diagnosis of gastric ulcer a carefully taken clinical list of symptoms is of the greatest importance in the opinion of Deanesly (*Brit. Med. Jour.,* London, August 28, 1920, No. 3113, p. 312) and Garcia Lagos (*Anal. de la Facult. de Med.,* Montevideo, July–August, 1919, iv, Nos. 7–8, p. 532), especially in regard to a definite time relation between pain and food. An improved technic for blood in the stools, and the interpretation of the findings, has been investigated by Meunier (*Presse Méd.,* Paris, May 8, 1920, xxviii, No. 29, p. 283). The typical gastric ulcer may be diagnosed with a high degree of accuracy by the aid of the Röntgen ray, according to McClure and Reynolds (*Bost. Med. and Surg. Jour.,* September 9, 1920, clxxxiii, No. 11, p. 321), but they lay stress on the importance of a correlation of the clinical and röntgenological studies, and state that the X-ray is not infallible (*Jour. Amer. Med. Assoc.,* March 13, 1920, lxxiv,

No. 11, p. 711). That the Röntgen findings may be conclusive as to the presence of the ulcer, but not always a reliable guide as to its site, is the opinion of Reinhard (*Deut. Zeit. für Chir.*, Leipzig, April, 1919, cxlix, Nos. 3–4, p. 145).

The dietetic treatment of gastric ulcer has been carefully studied by Kelling (*Arch. für Verdauungs-Krankh.*, Berlin, 1920, xxvi, Nos. 5–6, p. 287), Crohn and Reiss (*Amer. Jour. Med. Sci.*, Philadelphia, January, 1920, clix, No. 1, p. 70) and Moynihan (*Brit. Med. Jour.*, London, December 13, 1919, ii, No. 3076, p. 765), the latter considering the method introduced by Sippy as being the most rational, but warns that chronic ulcer treated by continued care in diet may heal, but in the majority of cases does not remain healed.

DISEASES OF LIVER AND GALL-BLADDER

Conflicting views are held as to the value of the various *tests for liver functioning,* none of which, according to Padilla (*Semana Méd.*, Buenos Aires, March 4 and 11, 1920, xxvii, No. 10 and 11, pp. 319 and 363), can be relied on implicitly, although Kinberg (*Hygiea,* Stockholm, August 31, 1919, lxxxi, No. 16, p. 689) believes his study on the elimination of amino-acids and ammonia following the ingestion of gelatine has shown that this method will prove of value.

When the typical syndromes are present Barker (*Jour. Amer. Med. Assoc.*, October 23, 1920, lxxv, No. 17, p. 1105) considers the *diagnosis of diseases of the gall-bladder and of the biliary passages* one of the easiest of the internists's tasks, but in their absence one of the most difficult. He enumerates the points in the anamnesis, the physical examination, the Röntgen-ray reports and the laboratory findings which he has found most helpful in establishing a diagnosis. The most valuable aid is the history, in the opinion of Cheney (*Amer. Jour. Med. Sci.*, Philadelphia, October, 1920, clx, No. 4, p. 469). In the differentiation between gastric and gall-bladder diseases, Leven (*Presse Med.*, Paris, November 15, 1919, xxvii, No. 68, p. 684) employs a " therapeutic test " which he believes of considerable value. A study of the biliary system contents as obtained by drainage into the duodenum has been made by Lyon (*Amer. Jour. Med. Sci.*, Philadelphia, October, 1920, clx, No. 4, p. 515), and he believes this method of study offers a scientifically correct diagnostic procedure. In the diagnosis of early cholecystitis, Brown (*Jour. Amer. Med. Assoc.*,

November 20, 1920, lxxv, No. 21, p. 1414) has found this Meltzer-Lyon method of diagnosis of the greatest value.

PNEUMOPERITONEUM

A röntgenological diagnostic procedure which promises to be of considerable clinical value is the X-ray study of the abdomen after inflation of the peritoneal cavity with oxygen or air. It appears to be of special value in the more exact localization of tumors, peritoneal adhesions, and liver defects (Rautenberg, *Deut. med. Woch.,* Berlin, January 29, 1920, xlvi, No. 5, p. 123; Stein and Stewart, *Jour. Amer. Med. Assoc.,* July 3, 1920, lxxv, No. 1, p. 7; Decker, *Münch. med. Woch.,* Munich, June 4, 1920, lxvii, No. 23, p. 664; and Emile-Weil and Loiseleur, *Bull. de la Soc. Méd. des Hôp.,* Paris, December 12, 1919, xliii, No. 36, p. 1077). That the procedure may occasionally be followed by a beneficial therapeutic effect has been noted by Kaestle (*Münch. med. Woch.,* Munich, June 18, 1920, lxvii, No. 25, 714), while Stewart and Stein (*Jour. Amer. Med. Assoc.,* May 1, 1920, lxxiv, No. 18, p. 1271) warn against patients who have been subjected to abdominal inflation assuming the erect posture for at least twenty-four hours.

INTESTINAL STASIS

The treatment of chronic intestinal stasis in children has been very completely outlined in an article by Taunton (*Brit. Med. Jour.,* London, December 20, 1919, ii, No. 3077, p. 806), who believes that prevention should be the first aim, and in discussing the medicinal treatment he warns against the frequent use of aperients, purgatives, cathartics, etc. The general and medicinal treatment of these cases has also been described by McClanahan (*Nebraska State Med. Jour.,* Norfolk, July, 1920, v, No. 7, p. 189). The employment of coarse, uncrushed grains in the treatment of chronic intestinal toxæmia is recommended by Strode and Benjafield (*Lancet,* London, January 10, 1920, i, No. 5028, p. 91), assuming that a lactic-acid fermentation is the condition to be aimed at, to which mode of treatment Bassler (*New York Med. Jour.,* July 10, 1920, cxii, No. 2, p. 45) adds bacterial treatment, based upon the findings in complete examinations of the stools and urine under known conditions of diet.

In view of the widespread use of phenolphthalein as a laxative,

frequently indiscriminately without the physician's advice, it may not be amiss to call attention to the occasional development of acute hemorrhagic nephritis in those employing this drug, which Schliep (*Münch. med. Woch.*, Munich, November 7, 1919, lxvi, No. 45, p. 1294), Rosenstein (*Münch. med. Woch.*, Munich, February 27, 1920, lxvii, No. 9, p. 263), and Silberstein (*Therap. Halb.*, Berlin, June 1, 1920, xxxiv, No. 11, p. 306) believe holds a definite etiological relationship. This is rather important in view of the enormous number of proprietary preparations with phenolphthalein as the active ingredient ("Use and Abuse of Cathartics," *Jour. Amer. Med. Assoc.*, January 3, 1920, lxxiv, No. 1, p. 30).

INTESTINAL PARASITES

A study of the stools of 308 children up to 12 years of age has convinced McLean (*Jour. Amer. Med. Assoc.*, June 26, 1920, lxxiv, No. 26, p. 1774) that intestinal parasites are infrequent in New York City children living under good hygienic conditions, only 2.27 per cent. being found harboring parasites. In the district of Zaragoza, Colombia, a study of the natives by Brosius and Bishop (*Jour. Amer. Med. Assoc.*, June 26, 1920, lxxiv, No. 26, p. 1768) revealed 98 per cent. were infected with *hookworm*. They believe one or two treatments with a thirty-five or forty minim dose of oil of chenopodium will effect a cure in the majority of cases. The two-treatment plan has been pursued by Darling (*Lancet*, London, July 10, 1920, ii, No. 5054, p. 69) in the treatment of hookworm, employing oil of chenopodium in doses of 1.5 c.c. given in single or broken doses, in hard gelatine capsules, while Kantor (*Amer. Jour. Med. Sci.*, Philadelphia, April, 1920, clix, No. 4, p. 497) prefers the intra-intestinal tube treatment, securing more than twice as many cures with one treatment than when administered by the mouth. The various drugs employed in the treatment of ankylostomiasis have been studied by Wrench (*Indian Jour. Med. Res.*, Calcutta, January, 1920, vi, No. 3, p. 393), who considers chenopodium a dangerous but efficient drug. That infestation with the broad tapeworm (dibothriocephalus latus) may be met with in immigrants and even in natives of this country has been noted by Lyon (*Jour. Amer. Med. Assoc.*, March 6, 1920, lxxiv, No. 10, p. 656) and Nickerson (*Jour. Amer. Med. Assoc.*, February 14, 1920, lxxiv, No. 7, p. 457). Another case of giardiasis

has been successfully treated by neoarsphenamin in the one reported by Carr and Chandler (*Jour. Amer. Med. Assoc.,* May 22, 1920, lxxiv, No. 21, p. 1444).

AMŒBIC DYSENTERY

While we have been accustomed to looking upon this disease as one peculiar to the tropics, the report of Cort and McDonald (*California Jour. Infect. Dis.,* 25: 501, December, 1919) will probably cause us to change our views and be on the lookout for this type of intestinal infection. The study of Buxton (*Brit. Med. Jour.,* London, January 31, 1920, i, No. 3083) suggests that the housefly is an important factor in the dissemination of this disease, and MacAdam (*Indian Jour. Med. Res.,* Calcutta, January, 1920, vi, No. 3, p. 363) reports further successful treatment with emetin, subcutaneously and by mouth.

VITAMINS

The numerous problems associated with vitamin deficiency have been studied experimentally by McCarrison (*Indian Jour. Med. Res.,* Calcutta, January, 1920, vii, No. 3, p. 633; *Brit. Med. Jour.,* London, February 21, 1920, i, No. 3086, p. 249; and *Indian Jour. Med. Res.,* Calcutta, July, 1919, vii, No. 1, p. 167), who suggests that certain gastro-intestinal disorders in the human subject may owe their origin to the long-continued subminimal supply of accessory food factors. Rice (*Jour. Amer. Med. Assoc.,* July 10, 1920, lxxv, No. 2, p. 100) believes it to be highly probable that not a few cases of such middle-life affections as hypertension, chronic Bright's disease, visceral ptosis, gastric and duodenal ulcers, etc., are but the remote, graver manifestations of that blighting factor in the deficient diet. That vitamins probably play an important part in alimentary canal secretions is the belief of Lumiere (*Bull. de l'Acad. de Med.,* Paris, March 30, 1920, lxxxiii, No. 13, p. 310).

While a stable vitamin product designated "V" has been prepared by Dubin and Lewi (*Amer. Jour. Med. Sci.,* Philadelphia, February, 1920, clix, No. 2, p. 264) the quantitative determination of these vague, poorly understood bodies is practically dependent upon their effect on the growth and health of animals previously subjected to a diet which is free of vitamins, as Schaeffer (*Médecine,* Paris, September, 1920, i, No. 12, p. 728) recommends, or upon cell

growth (yeast) as suggested by Williams (*Jour. Biol. Chem.*, Baltimore, June, 1920, xlii, No. 2, p. 259), and Eddy and Stevenson (*Jour. Biol. Chem.*, Baltimore, August, 1920, lxiii, No. 1, p. 295). An interesting observation has been made by Hart, Steenbock and Ellis (*Jour. Biol. Chem.*, Baltimore, July, 1920, xlii, No. 3, p. 383), namely, that the antiscorbutic property of milk is apparently dependent upon the diet of the cow from which the milk is obtained. The juice of orange, lemon and grapefruit has been found by Osborne and Mendel (*Jour. Biol. Chem.*, Baltimore, July, 1920, xlii, No. 3, p. 465), and Byfield, Daniels and Loughlin (*Amer. Jour. Dis. Child.*, Chicago, May, 1920, xix, No. 5, p. 349) quite as potent in this regard as milk, while Hess (*New York State Jour. Med.*, New York, July, 1920, xx, No. 7, p. 209) considers canned tomato the most serviceable antiscorbutic for artificially fed infants. That nuts are sources of abundant quantities of water-soluble vitamin has been shown by Cajori (*Jour. Biol. Chem.*, Baltimore, September, 1920, xliii, No. 2, p. 583).

Efforts to extract the fat-soluble vitamin from carrots, conducted by Steenbock, Boutwell, Lell and Gross (*Jour. Biol. Chem.*, Baltimore, May, 1920, xlii, No. 1, p. 131) were not very satisfactory, and Mendel (*New York State Jour. Med.*, New York, July, 1920, xx, No. 7, p. 212) has shown that dried tomato is relatively rich in fat-soluble vitamin, containing as great a proportion as an equal amount of butter, while Daniels and Loughlin (*Jour. Biol. Chem.*, Baltimore, July, 1920, xlii, No. 3, p. 359) found that lard and cottonseed oil contain a relatively low proportion of this substance. In plant structures Steenbock and Gross (*Jour. Biol. Chem.*, Baltimore, February, 1920, xli, No. 2, p. 149) have noted that the leaves are usually richest in fat-soluble vitamin, the roots next, and grains last of all. The effect of heat upon these substances has been studied by Emmett and Luros (*Jour. Biol. Chem.*, Baltimore, August, 1920, xliii, No. 1, p. 265), Givens and McClugage (*Jour. Biol. Chem.*, Baltimore, July, 1920, xlii, No. 3, p. 491), Whipple (*Jour. Biol. Chem.*, Baltimore, October, 1920, xliv, No. 1, p. 175), Miller (*Jour. Biol. Chem.*, Baltimore, October, 1920, xliv, No. 1, p. 159), and Steenbock and Boutwell (*Jour. Biol. Chem.*, Baltimore, February, 1920, xli, No. 2, p. 163). That certain sun-dried vegetables retain to some extent their antiscorbutic property has been shown by Shorten and Roy (*Indian Jour.*

Med. Res., Calcutta, Spec. No., 1919, p. 60), but that the overcooking of vegetables may seriously destroy this factor has been reported by Chick and Dalyell (*Brit. Med. Jour.,* London, October 9, 1920, ii, No. 3119, p. 546).

PELLAGRA

That pellagra may be produced in man by feeding a monotonous, principally cereal, diet has been demonstrated by Goldberger and Wheeler (*Arch. Intern. Medicine,* Chicago, May 15, 1920, xxv, No. 5, p. 451), who believe that diet is the direct cause of this disease. The dietetic factor is not the only one involved, according to Enright (*Lancet,* London, May 8, 1920 i, No. 19, p. 998) and Viswalingam (*Jour. Trop. Med. and Hygiene,* London, February 16, 1920, xxiii, No. 4, p. 46), the latter believing that a superadded infection is essential, while Bigland (*Lancet,* London, January 31, 1920, i, No. 5031, p. 243) believes disordered functions of certain endocrine glands play a large part. That this disease may develop in apparently well-fed individuals has been pointed out by Bigland (*Lancet,* London, May 1, 1920, i, No. 18, p. 947), and Roberts (*Jour. Amer. Med. Assoc.,* July 3, 1920, lxxv, No. 1, p. 21).

BERIBERI

The symptomatology of this disease, as observed among a large number of patients, has been tabulated by Leggate (*Edinburgh Med. Jour.,* January, 1920, xxiv, No. 1, p. 32), and Hepburn (*Brit. Med. Jour.,* London, April 3, 1920, i, No. 3092, p. 466). Beriberi is viewed by Sprawson (*Quart. Jour. Med.,* London, July, 1920, xiii, No. 52, p. 337) as a syndrome arising from various causes, and Kiyosaki (*Naval Med. Assoc. Bull.,* Tokio, October, 1919, No. 26, p. 1) has isolated a mucor from the feces of beriberi patients which produced toxic effects in experimental animals, resembling motor paralysis.

SCURVY

In the diagnosis of the infantile form of this disease, Comby (*Médecine,* Paris, August, 1920, i, No. 11, p. 673) lays stress on the importance of suspecting its presence when the infant keeps its limbs still and cries if they are touched, and Hess and Unger (*Amer. Jour. Dis. Child.,* Chicago, May, 1920, xix, No. 5, p. 331) have observed

beading of the ribs in infantile scurvy, a symptom formerly considered pathognomonic of rickets.

Definite changes in the suprarenals have been observed by McCarrison (*Indian Jour. Med. Res.,* Calcutta, July, 1919, vii, No. 1, p. 188) in guinea-pigs fed on a scorbutic diet. The antiscorbutic vitamins have been found in large amounts by Hehir (*Indian Jour. Med. Res.,* Calcutta, Spec. No., 1919, p. 79) and McClendon and his associates (*Jour. Biol. Chem.,* Baltimore, December, 1919, xl, No. 2, p. 243) in cereal grains which have been sprouted.

RACHITIS

The cause of this disease is believed by Pereda (*Prog. de la Clinica,* Madrid, September, 1919, vii, No. 81, p. 117) to be traceable to defective digestion of fats, a view which Hutchinson (*Glasgow Med. Jour.,* January, 1920, xi, N. S., p. 8) considers erroneous. A review of recent research has convinced Höjer (*Hygiea,* Stockholm, July 31, 1920, lxxxii, No. 14, p. 449) that rachitis is a deficiency disease, Nathan (*Presse Méd.,* Paris, August 21, 1920, xxviii, No. 59, p. 577) holding the same opinion, while Hess and Unger (*Jour. Amer. Med. Assoc.,* January 24, 1920, lxxiv, No. 4, p. 217) have made a study of rickets which seems to show that the danger to infants of a diet deficient in fat-soluble vitamin is slight, provided it includes sufficient calories and otherwise is complete.

BOTULISM

During last winter there appeared in the medical and lay press numerous reports of poisoning with bacillus botulinus, in nearly every case due to the eating of spoiled olives, usually ripe olives, in only one instance canned beets being responsible (Randell, *Jour. Amer. Med. Assoc.,* July 3, 1920, lxxv, No. 1, p. 33) and in one was pickled herring the cause (Bitter, *Deut. med. Woch.,* Berlin, November 20, 1919, xlv, No. 47, p. 1300). That this organism is widely distributed in nature has been shown by the study of Burke (*Jour. Bacteriology,* Baltimore, September, 1919, iv, No. 5, p. 541); and Dickson and his associates (*Arch. Intern. Med.,* Chicago, December 15, 1919, xxiv, No. 6, p. 581) have shown that the spores are quite resistant to heat when mixed with animal or vegetable protein. They question the efficiency of the ordinary canning process in the presence

of spores of bacillus botulinus, the usual method of canning olives being described in the *Am. Food Jour.,* xv, No. 26, February, 1920. The importance of bacteriological investigation in food control is emphasized by Jordan (*Amer. Jour. Public Health,* February, 1920, x, No. 2, p. 142).

For detecting the presence of bacillus botulinus in canned olives De Bord, Edmondson and Thom (*Jour. Amer. Med. Assoc.,* May 1, 1920, lxxiv, No. 18, p. 1220), and Sisco (*Jour. Amer. Med Assoc.,* March 6, 1920, lxxiv, No. 10, p. 690) state that the odor is fairly definite and of a putrefactive nature. In addition, several of the observations state that the appearance of the olives was definitely indicative of putrefaction, although these tests are of no value except when the fruit container is first opened, as they may be disguised in cooking or preparing them for the table.

The initial symptoms of poisoning by the bacillus botulinus are chiefly referred to the throat and eyes, inability to swallow, choking, double vision, prostration, dyspnœa, tachycardia, gastro-intestinal symptoms are usually lacking and consciousness is retained (Fontaine, "Medical News," *Jour. Amer. Med. Assoc.,* February 14, 1920, lxxiv, No. 7, p. 470). The length of time before symptoms develop, Glancy (*Canadian Med. Assoc. Jour.,* Toronto, November, 1920, x, No. 11, p. 1027) found to vary between twenty-six hours and five days, and De Saint-Martin (*Bull. de la Soc. Méd. des Hôp.,* Paris, January 16, 1920, lxiv, No. 2, p. 52) observed eye changes which were still evident six months after recovery.

An antitoxin has been prepared by Dickson and Howitt (*Jour. Amer. Med. Assoc.,* March 13, 1920, lxxiv, No. 11, p. 718), who recommend for therapeutic purposes a polyvalent antitoxin, which should be given in large amounts and intravenously. Anti-botulinus serum has been administered by Jennings, Haass and Jennings (*Jour. Amer. Med. Assoc.,* January 10, 1920, lxxiv, No. 2, p. 77), Sisco (*Jour. Amer. Med. Assoc.,* February 21, 1920, lxxiv, No. 8, p. 516), and Randell (*Jour. Amer. Med. Assoc.,* July 3, 1920, lxxv, No. 1, p. 33), but to such a small number of cases that the results cannot be considered conclusive, but are, if anything, rather discouraging. All observers call attention to the very high mortality attending these cases of botulism.

WOOD ALCOHOL

Prohibition has resulted in the appearance of an increasing number of cases of wood-alcohol poisoning. It is, therefore, important that one should be on the lookout for such cases, and become familiar with their diagnosis and treatment. It appears to differ in its toxicity in different individuals, the symptoms naturally varying in severity. In the extreme cases the patient is usually comatose, usually with cyanosis which may be extreme, the respiratory rate is lowered, with rapid pulse, dilated pupils, headache, nausea, vomiting and vertigo being frequently noted (Isaacs, *Jour. Amer. Med. Assoc.,* September 11, 1920, lxxv, No. 11, p. 718). The paralysis is usually most marked in the eye, blindness being frequently reported (Zethelius, *Hygiea,* Stockholm, January 31, 1920, lxxxii, No. 2, p. 45; Bab, *Berl. klin. Woch.,* Berlin, October 20, 1919, lvi, No. 42, p. 995; and Harboe, *Norsk. Mag. for Laege.,* Christiania, April, 1920, lxxxi, No. 4, p. 379).

The recovery of a severe case treated with intravenous injections of 5 per cent. sodium bicarbonate has been reported by Harrop and Benedict (*Jour. Amer. Med. Assoc.,* January 3, 1920, lxxiv, No. 1, p. 25), and six cases of moderate severity were successfully treated by Isaacs (*Jour. Amer. Med. Assoc.,* September 11, 1920, lxxv, No. 11, p. 718), who employed sodium bicarbonate by mouth and by vein. Lumbar puncture appeared to be of considerable benefit in the three cases of blindness from methyl alcohol poisoning observed by Zethelius (*Hygiea,* Stockholm, January 31, 1920, lxxxii, No. 2, p. 45).

Ethyl alcohol, which has been denatured with nitrobenzol, was responsible for a number of cases of acute poisoning observed by Scott and Hanzlik (*Jour. Amer. Med. Assoc.,* April 10, 1920, lxxiv, No. 15, p. 1000), the most striking symptom being a dark, almost black, discoloration of the extremities, face and neck. Although Scott and Hanzlik considered the poison of low grade and non-fatal, Donovan (*Jour. Amer. Med. Assoc.,* June 12, 1920, lxxiv, No. 24, p. 1647) reports a case which resulted in death, due apparently to respiratory paralysis.

PROGRESS OF SURGERY FOR THE YEAR 1920

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SURGERY OF THE CHEST

The possible advances in civil medicine suggested by experiences in treating war injuries of the chest has been discussed by Yates (*Annals of Surgery,* 1920, 71, 241), who believes that diseases of the chest present opportunities for therapeutic progress and for wide service, the equal of those offered by the rest of the body.

The most important feature in medical and surgical therapy is the prevention and relief of pleurisy. Pleurisy is the commonest indication for treatment, the most frequent cause of failure of intrathoracic operations undertaken to relieve other diseases, and, if uncontrolled, it leads to serious and often permanent impairment of parietal mobility, intrapleural negative pressure and pulmonary elasticity, hence to some degree of incapacity.

Early drainage in acute pleurisy and primary drainage at the time of thoracotomy have been discredited because of faulty methods employed and not because drainage under these conditions is contraindicated by its antagonism to physiological processes. Simple airtight, one-way drainage of the chest, employing the increased intrathoracic pressure of inspiration and of coughing as expulsive and of disrupting forces, is as effective in thoracic surgery as similar procedures in joint surgery. Drainage of the pleural cavity is easy and pleural irritation slight if the tube is introduced so as to avoid undue contact with the visceral pleura.

The various principles discussed by Yates make thoracotomy a safe operation, because they afford a control of pleurisy and protect respiration and circulation. The same principles applied by internists will reduce the incidence of empyema, relieve much of the distress of tuberculous pleurisy and probably improve the results obtained in treating pulmonary tuberculosis. An increasing recognition of the frequency of impaired diaphragmatic function resulting from slight attacks of pleurisy indicate the greater attention which must be given to the prevention of late complications by early active motion of the lungs, as soon as curtailment of the acute process permits. The

importance of deep and full respiration becomes more and more evident. Prevention and therapeutic measures to obtain the desired results are determined by thoracic physiology.

The importance of the vital capacity in thoracic surgery has been investigated by Graham (*Journal of the American Medical Association,* 1920, 75, 992), who states that its determination will indicate approximately the maximum opening in the chest wall compatible with life, if the mediastinum is not already stabilized by adhesions and induration. If such observations are made before establishing open drainage in cases of empyema or before any thoracic operation, doubtless many lives will be saved. Both theoretical conclusions and actual observations show that in empyema the vital capacity is greatly reduced. That this reduction does not depend merely on the presence of the fluid exudate in the pleural cavity is shown by the fact that an appreciable increase in the vital capacity occurs only gradually after the removal of the exudate. This fact is of importance in being an additional argument against the establishment of an open drainage during the acute pneumonic stage of an empyema when the vital capacity is so low as to approximate the tidal air requirement. Extensive thoracoplastic operations result in apparently a permanent marked reduction in the vital capacity. They should be employed, therefore, only in the rarest instances and only after other methods have been given an intelligent trial for at least many months.

Abscess of the Lung.—An analysis of pathological and clinical observations by Hartwell (*Annals of Surgery,* 1920, 72, 333) indicates that the pneumococcus is not an important factor in lung abscess; that the staphylococcus aureus is often responsible; that abscess of the lung frequently is a primary lesion in that a true pneumonic consolidation as connoted by the name pneumonia does not precede it; that abscess of the lung includes in its pathology a marked degree of surrounding necrosis, or even massive gangrene, and that when an empyema ruptures into the lung and discharges through the bronchus the original lesion was a lung abscess which, by its extension, finally found two outlets for its purulent content.

Certain points in the pathogenesis of suppuration of the lung are emphasized by Wessler (*J. A. M. A.,* 1920, 73, 1918), who believes that there is little doubt, from a study of the cases of post-operative abscess, that the disease is bronchogenic. It is equally probable that

the infection is primarily gangrenous and owes its origin to definite forms of anaërobic microörganisms. The pathogenesis of post-pneumonic abscess is not so clear. In the chronic types there is, undoubtedly, primarily a pneumonic process, which is due to the usual bacteria, such as the streptococcus and pneumococcus, which have the power to incite a chronic type of inflammation. There is, however, a group of so-called acute post-pneumonic abscesses or gangrene in which, without any evidence of operation or aspiration, there is, nevertheless, a primary gangrenous inflammation. In these cases the onset of fetid expectoration occurred on the thirteenth or fourteenth day, just as in the cases of aspiration. They resembled the latter also in the frequent involvement of the upper lobes and in the early development of large cavities. The question, therefore, arises whether these are truly cases of pneumonia with subsequent development of gangrene, or whether they are not also due to the aspiration of septic material from the teeth or the tonsils, perhaps in the act of snoring during sleep. That this is not improbable will be evident from a consideration of several cases in which aspiration gangrene developed during unconscious states.

Empyema.—As there exists at present some confusion regarding the best routine method of procedure in acute empyema, Eggers (*J. A. M. A.*, 1920, 75, 995) has suggested the following treatment. No one method will always give uniformly good results, and no attempt should be made to make a case fit a given method of treatment. On the contrary, that treatment which will most likely restore the patient to health in the shortest time should be adopted in each case. Individualization is the keynote of the successful treatment of empyema, and clinical experience and observation made at the necropsy table must guide us in the right direction. From these observations we have learned that there is such a thing as a common type of empyema, following pneumococcus pneumonia, in which the pus collects in the lower part of the chest. It becomes walled off early, and the costopleural angle becomes obliterated by adhesions of the diaphragm to the chest wall. Intercostal incision in the eighth or ninth space or the resection of a portion of the eighth or ninth rib will place the drainage at the dependent part of the cavity.

Simple open drainage or the addition of irrigations, preferably with surgical solution of chlorinated soda (Dakin solution), consti-

tutes the after-treatment. By far the larger number of all empyema cases conform to this type.

Taking this as a basis one may modify the treatment as indicated in a given case. If there is an unusually large amount of fluid, as is so often found in the septic streptococcus or staphylococcus cases, and it is considered that the presence and absorption of this fluid itself, regardless of the stage of the pneumonia, is dangerous to the patient, one of two courses may be followed.

1. The fluid may be aspirated, and this may be repeated as often as the thorax refills, until the pneumonia has subsided. Coincident with resolution, the fluid has usually become pus and has become walled off. A simple drainage opening may then be made, as advocated above, and the case treated the same as a pneumococcus empyema.

2. If more urgent treatment is demanded, one may make a small intercostal incision, introduce a drainage tube, close the tissues around it, and then lead the tube into a partly filled bottle under the bed. This gives a closed method of drainage. A Brewer tube may be used for this purpose, or an ordinary rubber tube sutured to the edges of the wound. Good drainage, with little respiratory disturbance, will be obtained. The tube fits snugly for from five to seven days, and at the end of that time the treatment can safely be converted into an open one, because by that time sufficient adhesions will have formed to prevent a pneumothorax.

Moschcowitz (*American Jr. Medical Sc.*, 1920, 159, 669) has drawn the following conclusions from his extensive experience in empyema:

Empyema in most instances results from a rupture of a small subpleural pulmonary abscess. An empyema is the final stage of a process in which the first stage is a serous pleurisy and the second stage a seropurulent pleurisy. The latter is the so-called " formative " stage of an empyema.

The formative stage is unaccompanied by pleural adhesions. The stage of final empyema is always accompanied by adhesions.

The vast majority of empyemata are of the encapsulated variety. Metastatic suppurations accompanying empyema are to be found rather as complications of the causative pneumonia than of the empyema.

The treatment should be given in the formative stage before there is frank pus.

The best surgical procedure in the formative stage is repeated aspirations, done every twelve to twenty-four hours. In a few cases this measure is curative.

Feeding with a diet, rich in calories, is an important adjunct in the treatment of the formative stage.

The treatment in the acute stage of an empyema consists of a simple intercostal incision. The operation need not be considered an urgent one, it is the so-called " late " operation. Urgent thoracotomy is indicated only in acute pyopneumothorax. The Carell-Dakin treatment, properly carried out, has proved of superlative value in the post-operative treatment of empyema and should be used in every case. There are no contraindications to its use.

The mortality of acute empyema by these methods is lower than that reported by other methods of treatment.

Chronic empyema should not occur, or at least should become very rare, if the above methods of treatment are practised.

Chronic cases of empyema may be defined as such which are not amenable to treatment by the Carrel-Dakin method.

Recurrences are usually the result of undue haste. The percentage of recurrences is less after the Carrel-Dakin method of treatment than after any other.

There have been numerous contributions on the subject of Chronic Empyema during the past year. The summary made by Hedblom (*Annals of Surgery,* 1920, 72, 317) covers the main features.

1. Chronic empyema has been recognized and treated during twenty-six centuries, but it is only sixty years since the first rib resection for drainage was done.

2. Chronic empyema is a disease which is not incompatible with life nor with a fair degree of health and usefulness. The principles of treatment should, therefore, be, first, the preservation of life, and, second, as far as possible, the conservation of function. Shortening convalescence, while very desirable, should always be a subsidiary consideration.

3. The choice of treatment must be made with cognizance of the variable etiology and pathology of the process, and the general condition of the patient.

4. A major procedure is indicated only if non-operative or less extensive surgical treatment reasonably may be considered less effective.

5. In case of sinuses and small cavities, adequate drainage is usually sufficient to effect a cure with or without short preliminary hypochlorite solution treatment. It is at least open to question whether a radical operation is indicated in these cases for the sole purpose of shortening convalescence at the risk of an appreciably increased mortality.

6. Dakin's hypochlorite solution treatment is the method of choice in the treatment of the ordinary type of chronic empyema cavity of any size.

7. A pulmonary decortication through a rib-spreading exposure, after preliminary hypochlorite solution irrigation, is the most conservative treatment for cavities that are not obliterated by drainage or Dakin's solution treatment alone. If such an operation is successful, the lung is restored to its normal structures and functional relationship, thereby obliterating the cavity. If the operation is only partly successful, the magnitude of a secondary destructive operation is proportionately decreased.

8. Since it is impossible to judge with certainty before operation of the relative expansibility of the lung in every recent non-tuberculous case, a decortication should be done rather than a destructive operation, thereby giving the patient the benefit of the doubt.

9. If the lung does not expand, or if a considerable cavity persists following decortication, a plastic operation is indicated.

10. If the cavity is of considerable extent or the patient debilitated, a two- or three-stage plastic operation is to be recommended.

11. The recognition of tuberculous empyema is often difficult. A history of primary pleurisy with effusion seems more often to signify a tuberculous condition than does a pulmonary lesion, unless the latter is active and extensive. A tuberculous empyema may be present in the absence of clinical or X-ray evidence of pulmonary involvement. The typical microscopic picture in the sectioned pleura or the demonstration of the bacilli in the exudate may constitute the only evidence in such cases.

12. A tuberculous empyema not secondarily infected should not be drained, and should be aspirated only for a considerable accumu-

lation of fluid. For a tuberculous empyema secondarily infected, either by operation or spontaneously, drainage is necessary.

13. In the absence of bronchial fistulas and of bleeding, secondarily infected tuberculous empyema may be markedly benefited by antiseptic solution treatment. The amount of fibrosis or other pathologic change in the lung in such cases determines the degree of expansion of the lung, whether following antiseptic solution treatment or decortication.

14. If the lung fails to expand in whole or in large part, a several-stage operation designed to collapse the chest wall is indicated. Tuberculous patients are relatively poor objective risks.

15. Adequate drainage is the first indication in cases of empyema cavities which are draining through large bronchial fistulas. The fistulas may be obliterated spontaneously following such treatment.

16. Operative closure of bronchial fistulas that persist is necessary to complete healing. It may be accomplished by decortication of the involved portion of the lung with cautery, suture, or skin plastic to cover the opening of the fistula. Occasionally healing results from simple granulation of surrounding tissue after destruction of the epithelial lining of the bronchial stoma.

17. Closing the bronchus that is draining pus from within the lung may result in a secondary lung abscess.

18. A large bronchial fistula is a contraindication to Dakin's solution treatment.

19. Sinuses of variable duration are common following more or less complete obliteration of empyema cavities; a large proportion eventually are obliterated without radical treatment; for those which persist, plastic operation is indicated.

20. Operative mortality in chronic empyema has been due largely to shock and infection. Reduction of the extent of operation and preliminary sterilization will materially lower this mortality.

Post-Operative Pulmonary Thrombosis.—In recording eight cases of death due to pulmonary thrombosis following surgical operations, Ochsner and Schneider (*Annals of Surgery,* July, 1920, 72, 91) have thought it worth while to investigate whether death could have been avoided in any or all of these cases had every possible precaution been taken to eliminate each one of the following etiologic factors to the greatest extent possible:

1. *Local Infection.*—It seems certain that even the slightest

amount of local infection may cause a thrombosis in a neighboring vein which may be loosened and serve as the cause of a fatal pulmonary thrombosis when it becomes lodged in the pulmonary vein. Although there is no evidence in any of the cases that this has acutally occurred, yet it seems important to still further perfect aseptic methods of operation. Of course, hæmostasis must be accomplished as a result of a normal thrombosis of the ends of the cut vessels, but it does not seem likely that such a thrombus will ever become loosened, so that it can cause death due to pulmonary thrombosis.

2. *Anæmia.*—Most of the patients showed some degree of anæmia. It seems likely that it might have been possible to correct this by more careful preliminary treatment or by transfusion of whole blood.

3. *Slowing of Blood Stream.*—It has been claimed that keeping patients for a long-continued operation in the Trendelenburg position would interfere with the blood stream in the extremities to such an extent that this serves as a predisposing cause. In none of the cases, except Case II, could this have been the cause, as none of the other operations were of long duration.

4. *Subnormal General Physical Condition.*—This obtained in three cases, but aside from the possible improvement which could have been secured by the preliminary transfusion of whole blood, it is doubtful whether this cause could have been eliminated to a marked extent.

5. *Cachexia.*—The only treatment which could be of any benefit would again be the transfusion of whole blood. Two of the cases belonged to this group and were similar cases to come under our care in the future we should make use of prophylactic transfusion of whole blood.

6. *Microörganisms in the Blood.*—None of the cases belong to this group, but we believe that in several cases of this class we have obtained great benefit by the transfusion of whole blood, although it is, of course, impossible to state that thrombosis has been prevented in any given case, although it failed to appear in any of those following transfusions.

7. *Excess of White Blood-Cells.*—This cause did not exist in any of the cases.

8. *Inefficient Hæmostasis.*—Until very recently we had not fully appreciated the importance of this etiologic factor, and it is quite possible that some of our deaths may have been due to an error in this

direction, although fortunately our method of closing the stump in hysterectomy for many years has corresponded to that upon which Zweifel lays so much stress, and it is possible that we may have escaped many deaths from pulmonary thrombosis in this class of cases without being entitled to any credit for this.

9. *Traumatization of Tissues with Retractors, etc.*—It seems likely that we have not exercised proper care in this direction, because until recently we have made use of heavy retractors for holding open the abdominal wound. These have now been discarded, and although we cannot trace any case directly to this cause, it seems likely that our technic has been bad in this direction.

10. *Injury to Veins of Extremities Due to Badly Arranged Operating Table.*—Zweifel and others have traced a number of their cases directly to the use of a table in which the knees are bent, so that the veins are compressed during the operation. They found a marked reduction of fatal cases upon abandoning this particular table. We have never used this type of table, but it seems proper to again direct attention to this apparent cause.

11. *Injury to Intima of Veins.*—Rough handling of tissue in the vicinity of the wound undoubtedly often causes an injury to the intima of veins, and it seems worth while to train oneself and one's assistants to avoid this as well as all other forms of unnecessary traumatization of tissues.

12. *Excess of Calcium Salts in the Blood.*—So many authors mention this as an etiologic factor that it may be important to consider it. So far we have paid no attention to this element.

It seems likely from these observations that in the future we will be justified in systematically adding the transfusion of 600 c.c. of whole blood to our preliminary treatment in a considerable proportion of cases belonging to a class which has in the past made up our list of deaths from pulmonary thrombosis and that the other precautions will be carried out with greater care.

It is likely that this will result in a considerable reduction in the death rate from post-operative pulmonary thrombosis.

GASTRIC ULCER

In discussing the surgical treatment of gastric ulcer, the first matter for consideration, according to Moynihan (*British Medical*

Journal, 1920, July 24, 99), relates to the importance of discovering any sources of still continuing infection which may first have led to the development of the ulcer. The primary infection cannot always be discovered, but it is a fair assumption to make that any chronic infection of which the evidences are still discoverable may have acted as a cause of the original ulcer, or have provoked a recurrence of it. The causal infection may not be found until the abdomen is opened, for a large number of the gastric ulcers operated on are secondary to an infection arising in some part of the intestinal canal, more especially in the appendix. In many cases the infection reaches the stomach from disease of the teeth or gums, the antrum, accessory sinuses or nasopharynx. If in any such case the lesion is a gross one and likely long to continue, it is necessary to deal with it before any operation upon the ulcer is undertaken.

Gastro-enterostomy is still the treatment for chronic gastric and duodenal ulcer, according to Coffey (*Annals of Surgery,* 1920, 71, 303), who reports the results in 233 patients. The cause of death in the series recorded is discussed, as is also the remote post-operative complication, the formation of secondary ulcers, which was noted in nine patients. Of these two followed simple posterior gastro-enterostomy. About 3.8 per cent. of the ulcers have recurred either at the point of excision or at a new place.

Four of the entire 233 patients are known to have developed carcinoma, and only one in the entire series of simple gastro-enterostomies. The mortality in simple gastro-enterostomy was 2.43 per cent.; all other operations combined show immediate mortality of about 9 per cent. In the 165 cases of simple gastro-enterostomy two secondary ulcers have been known to result, while seven out of 67 of the more direct and radical operations, or more than 10 per cent., have developed secondary ulcers.

All the evidence indicates that simple gastro-enterostomy has given better results from the standpoint of recovery of the patients than have any of the radical operations.

Ulcers of the Posterior Wall.—W. J. Mayo (*Annals of Surgery,* 1920, 72, 109) found that by dividing the stomach into thirds the pyloric third showed only 8.2 per cent. of ulcers of the posterior wall, the middle third 75.8 per cent. and the cardiac third 16.5 per cent. All the ulcers were of the chronic perforating variety. In 53 cases

the coats of the stomach were penetrated and the crater of the ulcer encroached on the liver or the transverse colon, or were embedded in a mat of adhesions. The main characteristics of the ulcer are chronicity, lesions usually large, more or less continuous distress, occasional exacerbations from localized peritonitis and anæmia, often accompanied by marked cachexia.

In the treatment of the condition, cautery or knife excision alone has a limited field of usefulness in cases of small ulcers in all situations. Gastro-enterostomy may be indicated at times on account of the general or local condition of the patient. Resection of the pyloric half of the stomach gives good results and is the operation of choice when the pyloric region is invaded.

Excision of the ulcer and a posterior gastro-enterostomy would seem the logical procedure in the average case. The procedure described by Mayo usually prevents subsequent fixation of the stomach, which complication has caused much trouble in many of the cases.

As the result of his study of jejunal and gastro-jejunal ulcers following gastro-enterostomy, Terry (*J. A. M. A.*, 1920, Vol. 75, 221) states that the exact etiology still remains in doubt; in all probability the principal factor is the diversion of acid chyme into a part of the intestine which has less neutralizing power than the duodenum. The other factors of prime importance are trauma, especially from retained sutures or anastomosis buttons, and infections.

In view of the very few reported cases of ulcer of the duodenum following pyloroplasty or gastro-duodenostomy, it would seem wise to employ those operations in suitable cases.

Gastro-enterostomy should be performed with much ease; clamps, if used, should be adjusted without traumatism of the viscera; only absorbable sutures should be used for the anastomosis.

Patients subjected to gastro-enterostomy should be instructed as to a suitable dietary, which should be continued for at least a year. In addition antacids should be given if the gastric analyses seem to warrant their employment.

Patients should be urged to seek competent advice when pain returns.

In considering gastro-enterostomy after acute perforation, Farr (*Annals of Surgery*, 1920, 72, 594) advises against it because of the added immediate mortality and because the end results of gastro-

enterostomy, even in the best clinics, are not 100 per cent. good. He believes suture of the ulcer should be performed and a later gastro-enterostomy for the small percentage of those requiring it.

On the other hand, Lewisohn (*Annals of Surgery*, 1920, 72, 599) contends that immediate gastro-enterostomy in the treatment of perforated pyloric and duodenal ulcers does not increase the mortality, and that this operation with pyloric exclusion simplifies the post-operative treatment considerably. Simple closure of the perforation will not cause a cure of the ulcer in a considerable number of cases. Gastro-enterostomy will guarantee a proper drainage of the stomach contents and overcome partial obstruction of the pylorus caused by post-operative adhesions.

Closure of the perforation, gastro-enterostomy and pyloric exclusion should be the method of choice. Simple closure of the perforation should be reserved for those patients whose general condition is so poor that even a rapidly performed gastro-enterostomy would be too much of an operative risk.

Although it is difficult sometimes to discover the precise etiologic factors interplaying in ulcer patients, Smithies (*J. A. M. A.*, 1920, 74, 1555) is convinced that careful search for such factors will commonly disclose information that is useful and of great service in the establishment of an intelligent therapeutic regimen; 552 cases of proved gastric ulcers are included in what is termed an etiologic-therapeutic classification.

Group	No. of cases	Per cent.
1. Infectious (chronic and acute)	173	33.1
2. Arteriosclerotic (with vascular hypertension, 56 cases; without vascular hypertension, 21 cases)	77	14.7
3. Visceral hypertonia (vagus or splanchnic hyperfunction)	68	13.0
4. Chronic anæmia (so-called "chlorotic")	61	11.3
5. Syphilitic	41	7.8
6. Visceral hypotonia (vagus or splanchnic hypofunction)	27	5.2
7. Post-operative	27	5.2
8. Industrial Intoxication (occupational poisonings)	22	4.2
9. Metabolic dysfunction (thyroid, suprarenal, pituitary, etc.)	18	3.4
10. Traumatic (abdominal injury from blows, falls, etc., intragastrically, foreign bodies)	8	1.5

SARCOMA OF STOMACH

Sarcomatous tumors of the stomach are among the most uncommon forms of neoplasm encountered in this organ. Douglas (*Annals of Surgery,* May, 1920, 71, 628) found that it occurs in one per cent. of all stomach tumors. The average age of incidence is 41.6, in contrast with an average age of 61.2 for carcinoma. The average age for lymphosarcoma is earlier than in the other forms.

Round-cell and lymphosarcoma are the most frequent forms found. They are more apt to be infiltrating, but the round-cell type may project into the stomach or form pedunculated tumors. Ulceration occurs oftener than in other sarcomata, but not as frequently as in carcinoma. Spindle-cell and myosarcoma are apt to form large exogastric tumors. While statistics show that the most common site is in the region of the pylorus, especially in the infiltrating form, other portions of the stomach are more frequently involved, and the pylorus itself is less often attacked or obstructed than in carcinoma. Metastasis also occurs less rapidly than in the latter, and the operative prognosis should therefore be better.

The diagnosis can rarely be made with certainty; the X-ray examination furnishes the most useful evidence. When in the presence of a tumor in a patient younger than those in which cancer is usual, a short history of gastric disturbance, absence of blood in the gastric contents and stool, and the presence of free hydrochloric acid, the absence of cachexia, and the presence of anæmia, while not ruling out cancer, ulcer, or syphilis of the stomach, may cause the diagnosis of sarcoma to be considered.

The total number of authenticated cases now recorded is brought up to 230, with a probable larger number on record, the reports of which are not now available.

Haggard (*Surgery, Gynecology and Obstetrics,* 1920, 31, 505) has analyzed 107 patients operated on for this condition. Of these cases 80 had partial gastrectomies or resections of the tumor and part of the stomach wall. Twenty-seven had explorations or gastro-enterostomies. Of 58 partial gastrectomies 15 died, a mortality of 25 per cent. Of 10 exploratory operations 8 died in the hospital; one was reported to be in poor health, after four months, and the remaining one was not heard from after two months.

ACUTE INTESTINAL OBSTRUCTION

The high mortality of acute intestinal obstruction is due to the fact that the diagnosis is not made early enough for proper surgical measures.

It is the belief of many that marked improvement in operative results has not been apparent in this condition. Richardson (*Boston Medical and Surgical Journal,* 1920, 183, 288) has analyzed 118 cases occurring from 1908 to 1917, in which the mortality was 41.5 per cent.

Deaver (*S. G. O.,* 1920, 30, 30) states that after considering all contraindications to surgery and all conditions which simulate acute surgical conditions of the abdomen the greatest toll in lives is exacted as a result of delay in diagnosis and in instituting proper treatment. The reduction of the period between onset and operation is the prime factor. It cannot be too often repeated that during this period the essential point is diagnosis and not treatment. If treatment there must be at this time, the physician should be sufficiently cognizant of the real issue and sufficiently resourceful not to be deluded or forced into doing that which will endanger the certainty of the diagnosis or unfavorably influence the course of the disease (*i.e.,* giving a purgative).

Summers (*Annals of Surgery,* 1920, 72, 201) believes that both the operative technic in certain instances and the post-operative treatment can be greatly improved, thus contributing toward lessening the mortality. In acute obstruction the enormously dilated intestine, in late cases filled with poisonous gases and fluids, should be largely evacuated through one or several small incisions. If the patient has been vomiting foul fecal-smelling fluids, a catheter should be introduced and fastened into the jejunum as near the origin as recognizable. Absorption is reduced and vomiting ceases, a positive proof of the efficacy of the procedure. In advanced cases the introduction of a catheter into the jejunum will not infrequently save life provided no attempt it made to open the abdomen for exploration or other surgical effort.

When the obstruction is in the sigmoid a drain should be put into the cæcum. When the mechanical cause of the obstruction is of the annular or napkin-ring area type, resection should not be done, but the

gangrenous area should be invaginated as an intussusception and the gut properly sutured.

The post-operative treatment follows Crile's teachings: Employing water, hot-packs and morphine. The latter is given to reduce respiration to 10–14 per minute; peristalsis is also decreased, pain is lessened, and physiological rest and sleep produced, the prime means of recuperation.

MESENTERIC THROMBOSIS

This condition, although uncommon, is of importance because of its gravity, difficulty of diagnosis, and the lack of success in its treatment. Ross (*Annals of Surgery,* July, 1920, 72, 121), in reporting six cases, concludes that arterial mesenteric thrombosis is a lesion causing a form of acute intestinal obstruction, rare, but occurring with sufficient frequency to make it imperative to remember its possible occurrence.

Its symptom complex is that of an acute intestinal obstruction, slower in onset than the purely mechanical forms of acute obstructive ileus (adhesion, volvulus, etc).

Venous mesenteric thrombosis is a condition of vaguer symptomatology and slower course than that found in arterial obstruction. It tends more to spontaneous cure, and is more likely to be a secondary or post-operative condition. When, however, its remedy by the establishment of collateral circulation does not occur, it gives the same final symptoms as does the arterial form of obstruction.

The treatment of mesenteric thrombosis is the treatment of any form of acute intestinal obstruction—early operation. The procedure employed must vary with the condition found at operation.

(*a*) If the vitality of a segment of gut has been gravely affected, resection is indicated.

(*b*) If the patient's condition contraindicates resection, the gut should be drawn out of the abdomen, fastened to the edges of the wound and a Paul's tube introduced, resection to be performed later.

(*c*) In the one case of this series that recovered nothing was done to the intestine and spontaneous cure resulted. While it is true that this may at times occur, and the judgment of the operator may indicate such a course, such isolated instances do not refute the general rule of early, radical procedure.

CARCINOMA OF THE LARGE INTESTINE

In the technic of removing carcinoma Bevan (*J. A. M. A.*, 1920, 75, 283) emphasizes the importance of three basic principles.

1. All of these cases can best be handled through four different incisions, namely, a muscle-splitting incision like an appendix incision on the right or left side; a large S-shaped incision on the right or left side. The midline incision is used only for carcinoma of the transverse colon.

2. It is essential in the removal of any portion of the large intestine from the cæcum to the rectosigmoid to mobilize very fully that section of the bowel which is involved in the process and in the operative procedure. This enables us to resect the cancer and to secure a good anastomosis without any tension.

3. After resection the proper technic is to close both ends of the intestine by crushing, ligating and invaginating with linen thread, and then do a lateral anastomosis.

In the cases in which obstructive symptoms are absent, a one-stage operation can be performed, using the above principles. Immediate closures should be made with drainage to the site of anastomosis.

When obstructive symptoms are present and the location of the cancer is known, we can plan the necessary preliminary colostomy to the best advantage. If the sigmoid is involved, we can employ the sigmoid or descending colon, if the colostomy is to be permanent. The cæcum is preferable when a temporary colostomy is desired.

The operation performed is termed a three-step operation and consists in a preliminary colostomy. After the obstructive symptoms subside and the general condition has improved sufficiently to warrant further interference, the second operation or resection of the growth and lateral anastomosis is performed. Some weeks later the colostomy is closed under a local anæsthetic.

Bevan regards this operation as more satisfactory than the Mikulicz; it is safer, secures immediate relief from the obstruction, allows a more radical resection and is more satisfactory to the patient.

Dowd (*Annals of Surgery*, 1920, 71, 155), in reporting a series of partial colectomy by the Mikulicz two-stage operation, obtained a much lower mortality, 12.5 per cent. than has been possible by the one-stage operation. Delay in healing, unpleasant convalescence and

probability of hernia constitute the main objections to the procedure. Proper mobilization of the desired portion of the intestine is the first element in obtaining good final results. If the adjacent tissues or lymph-nodes are involved, they, too, are to be removed, when possible. This is done without regard to the method of excision.

CANCER OF THE RECTUM

The ideal for the surgical treatment of cancer of the rectum is maximum operability, maximum percentage of permanent cures and the reduction of the immediate mortality to zero. According to Crile (*J. A. M. A.*, 1920, 75, 286), the principal cause of death is not shock; but death results from infection and absorption of the toxins of feces. The first surgical step, therefore, should be the complete diversion of the fecal stream by a preliminary colostomy. This is usually performed under analgesia and local anæsthesia, and causes but little depression. The incision for the colostomy is made large enough to ascertain whether or not there is involvement of the liver or of the lymphatic nodes, as well as the extent of the local invasion. It is important to angulate sharply the colostomy so that every particle of the fecal stream is diverted and none passes through the rectum.

At the end of a week, or as soon as both the local and the general conditions warrant it, the major operation is performed. Infection of the field is at first controlled by means of packing with iodoform gauze well wrung out, but as soon as the suture line is secure, the Carrel-Dakin method is employed. If the operation is extensive and of a nature to presuppose the development of peritonitis, or should peritonitis unexpectedly appear, the opium-water-posture-heat method is at once inaugurated. This method is all but specific.

Blood transfusion is promptly performed if there is a secondary anæmia, or if healing is delayed.

When the intestinal healing is complete, and not until then, the temporary colostomy is closed by a plastic operation and the sigmoid loop dropped back into place.

By following the above method Crile has performed twenty radical operations without a death.

In reporting his observations on cancer of the rectum, Wells (*S. G. O.*, 1920, 31, 472) notes that the sexes are about equally affected. The majority of cases appear at an advanced age, but one

was seen between twenty and thirty, and four between thirty and forty. The early symptoms in the series of 53 cases were pain in 28, blood in the stools in 27 cases. Loss of weight was present in 19 cases, obstruction to defecation in 18 cases, diarrhœa in 11, foul discharge in 10, an obvious tumor in 8, acute obstruction in 6, incontinence of feces in 6, piles in 6, urinary retention in 3, urinary fistula, prolapse of the rectum, abdominal tumor and ribbon stools in one case each.

From a study of the statistics of many clinics it is manifest that the operability has been increasing rapidly in very recent years and the operative mortality markedly decreasing. We have failed in early diagnosis and in not employing surgery that was daring enough. Cancer of the rectum should not be regarded as a hopeless condition, that it can be cured is demonstrated by the results of many clinics.

PSEUDOMYXOMA PERITONEI

The most tenable theory as to the etiology of this condition, according to Biggs (*Annals of Surgery,* 1920, 71, 619), is that of cellular implantation, the epithelial cells lining the cyst, together with the pseudomucinous content of the cyst, being discharged through a rupture of the cyst wall into the peritoneal cavity, the cells functioning as they did in their original situation.

The condition at first was considered to be the sequel to a previously existing ovarian cyst, until it was shown that the appendix may be the seat of the primary pathology. Seelig's (*S. G. O.,* 1920, 30, 570) report deals with the subject in males, the appendix being the point of origin of the condition in two instances under his observation. Pseudomyxoma has no distinct symptomatology, except when the lesions are advanced and widespread. The symptoms are those due to mechanical interference with function and may be caused by blocking or closing of the lymph spaces, cutting off the blood supply, thickening of the peritoneal covering of organs, resulting in tumor formation on their surfaces and encroaching on functionating tissue. Constriction of the intestine is not uncommon. Early cases will be discovered at operation, late cases presenting effusion with irregular, firm tumor formations distributed throughout the abdominal cavity can be diagnosed before operation.

Biggs regards this condition as not entirely hopeless, in his cases the earliest recurrence was in twenty-six months; in no case was the wound infected, although in one instance twelve operations were done; intra-abdominal suppuration did not occur; there was no operative mortality, the only death being nine years after the patient was first seen. If the original lesion is entirely extirpated, all pseudomucin removed, and affected areas of the peritoneum carefully wiped off with wet gauze, cures will more often result in the early cases, and certainly the patients may be free from recurrence for many years.

HYPERPLASTIC TUBERCULOSIS OF THE INTESTINES

In discussing this condition, Erdman (*Annals of Surgery,* 1920, 71, 637) alludes to the four different types which may be encountered. (1) The ulcerative type, a common and often primary lesion in children; also occurs as a secondary lesion in adults with advanced pulmonary tuberculosis. (2) The cicatricial or stenosing type, results from contracture of the completely healed ulcer and produces a narrow fibrous stricture. It is seen usually in the small intestine and may be multiple. When present in the large intestine it never causes real obstruction. (3) The entero-peritoneal type is found in the ileo-cecal region and combines ulceration with hyperplasia of the intestinal wall and involves the adjacent peritoneum, mesentery and lymph-nodes. (4) Chronic hyperplastic tuberculosis, essentially a disease of the cæcum, is also found in the terminal ileum, the flexures of the colon and in the rectum.

Tuberculous infection of the intestinal tract may occur primarily, is rare in the adult (1 to 3 per cent.), but occurs in from 17 to 37 per cent. in infants and young children, but here the lesion is either tuberculous entero-colitis or tuberculous peritonitis and not the hyperplastic type of tuberculosis.

The mode of infection may be either indirect, where the bacilli are borne by the blood or lymph from a lesion elsewhere; or direct, through mucosa from ulcers on the surface.

The symptoms are slow and insidious, usually from one to three years elapsing before the gradual increasing stenosis directs attention to the local lesion. Early symptoms are indefinite gastro-intestinal disturbances, frequently with alternating constipation and diarrhœa.

GALL-BLADDER

Maguire (*Surg., Gyn. and Obstetrics,* 1920, 31, 617) has reviewed his operative results in gall-bladder and duct surgery and draws the following summary:

All gall-stones have their origin in a primary cholecystitis. Typhoid bacilli is present only in 7 to 10 per cent. The mode of transmission of the primary infection is not positively determined, it is almost always carried by the blood-stream, and rarely, if ever, by direct extension. It is probably more frequently associated with a primary lesion elsewhere in the abdomen.

A diseased appendix is very frequently present when stones are found in the gall-bladder. It is probably the cause of the primary cholecystitis in more instances than is commonly believed. Gall-stones are rare in young people, in less than 15 per cent. was the patient under thirty years, while over 60 per cent. occur between the ages of thirty and fifty years.

Jaundice has received too much emphasis as a diagnostic symptom. Probably when the primary cholecystitis is present, a goodly proportion have a mild jaundice, but it is slight and usually forgotten. Stones in the gall-bladder or the cystic duct produce jaundice only by pressure on the common duct, or by associated cholecystitis. Attacks of pain in the upper quadrant is the most frequent symptom of stones.

Cholecystectomy is the operation of choice where there are stones in the gall-bladder or cystic duct. It is probably the operation of choice where stones are in the common duct, if one is positive all stones have been removed, because stones in the common duct are so often associated with old contracted gall-bladders. The mortality of cholecystectomy is now sufficiently low that decision for or against the operation should be judged largely by the percentage of ultimate cures.

In discussing the surgical significance of jaundice, C. H. Mayo (*Surg., Gyn. and Obstetrics,* 1920, 30, 545) states that at the time of operation on patients who have had jaundice, or who are free at the time of operation, the surgeon must have in mind the fact that jaundice is an essential feature of several conditions, and that it is an indication of serious disease in the majority of cases. From 5 to 8 per cent. of the cases of jaundice are due to serious infection of the

gall-bladder, possibly gangrene, with or without stones; they are usually accompanied by a degree of pancreatitis with marked swelling of the lymph-nodes on the ducts.

Jaundice from cancer presents a serious problem, although it represents but 15 per cent. of the cases seen; one-half of these are from cancer of the liver, the other half from cancer of the pancreas, or the gall-bladder and ducts.

Carefully analyzing the causes for reoperation in gall-bladder disease, Deaver and Reimann (*J. A. M. A.*, 1920, 74, 1061) found the pathologic condition most frequently noted after operation to be adhesions (39), while the most potent cause for return of symptoms after operation proved to be stone in the gall-bladder and ducts (26). Next in frequency were persistence of infection, cholecystitis (17); fistula, 11 (biliary, 9; duodenal, 2); common duct obstructed, 10; chronic pancreatitis, 8; pancreatic lymphangitis, 6; cholecystitis, 6; pyloric obstruction, 5; dilatation of ducts, 5; carcinoma, 4 (pancreas, 2; gall-bladder, 2); stricture of ampulla of Vater, 2.

In experimental work on the relationship of streptococcus to gall-bladder disease, Reimann concludes that the particular streptococcus showed no elective affinity for the gall-bladder of the animals. This conclusion in itself does not negative the importance of the streptococci in the human gall-bladder. It should be remembered, however, that with streptococci in the gall-bladder, a chronic toxæmia may be present for long periods of time; a constant stimulus for lymphangitis and connective tissue proliferation is present, and an opportunity for a general bacteræmia is always at hand.

APPENDICITIS

MacLaren (*Annals of Surgery*, 1920, 72, 207) states that more than one-half of the post-operative appendicitis deaths have been late, the patients dying not from acute peritonitis, but rather from exhaustion due to prolonged intraperitoneal suppuration. A few die from intestinal obstruction due to bands, but more frequently these obstruction cases are septic ileus.

The secret of success in these cases is eternal vigilance. Watch them with great care; make frequent rectal examinations; palpate the left side of the abdomen and be prepared to explore under local anæsthesia. If there is a return of pain and rigidity, or a marked

rise in temperature and pulse, early opening and drainage of secondary abscesses will save the patient; later opening of this same abscess will not always help.

The general mortality in 255 cases was 5.09 per cent. In securing these results vaginal drainage of pelvic abscess was used ten times; rectal drainage was used 33 times; occasionally before operation, but usually some days after laparotomy. In complicating intestinal obstruction drainage of the intestine with Paul's tube has been of great help.

The Carrel-Dakin method in acute appendicitis has been employed by Rulison (*Surg., Gyn. and Obstetrics,* 1920, 30, 294) in 28 cases. The contrast to the cases treated by simple drainage or by daily irrigation has been sharp, the period of discharge of foul-smelling pus with shreds of slough from abdominal wall or abscess cavity in all cases being greatly lessened, and in some cases minimized to a striking degree. There were few complications, no fecal fistulæ, no serious accidents following the injection of Dakin's solution intra-abdominally, nor did the patients suffer pain reactions following the injections, except two late injections in one case. The patients were discharged with better wounds, and the results indicate that the percentage of herniæ will be materially decreased.

The technic is fully described by the author, who lays emphasis upon the necessity of thoroughly mastering the details as well as the principles underlying the introduction of such antiseptics as Dakin's fluid into deep infected abdominal drainage tracts. If one is not willing to give the time necessary to gain a correct theoretical understanding, and is not willing to give the cases careful personal attention at daily dressing, the method should not be employed, as it will probably not only prove disappointing, but may result in serious complications.

HERNIA

The operation described by Stetten (*Annals of Surgery,* 1920, 71, 744), while based on the Bassini and Halstead principles, differs, however, in that it utilizes, to the fullest extent, all the useful, available structures for the repair of the hernial orifice, without mutilation or distortion, and insures a maximum guarantee against recurrence. Essentially, it consists in the overlapping of the external oblique

aponeurosis beneath the transplantic cord and over the Bassini suture. This method, the technic of which is fully described and illustrated, has been in use for three years, and has been employed in every conceivable type of hernia without recurrence. Difficulties from the subcutaneous placing of the cord have not been observed.

The method is particularly serviceable in direct and recurrent herniæ, especially large and difficult ones, in sliding herniæ, and in cases where the development of the internal oblique and conjoined tendon is poor or where Poupart's ligament is thin or tears easily. These latter conditions are especially found in elderly patients, who have had their herniæ for many years and have worn trusses. It was in these difficult cases that the insufficiency of the single suture line between the internal oblique and conjoined tendon with Poupart's ligament was noted. Since the adoption of the method, the formation of a flap from the rectus muscle or anterior rectus sheath has been unnecessary, even in the most unfavorable cases.

A description of a similar technic is found in Schley's article (*Annals of Surgery,* 1920, 71, 753).

Taylor (*Archives of Surgery,* 1920, 1, 382) in an exhaustive review of hernia operations, found in both types of hernia, when the conjoined tendon was found to be lacking, the percentage of recurrence is exceedingly high (35.8); the best results in such cases have been obtained when a flap of the sheath of the rectus muscle has been made use of. The transplantation of the rectus muscle seems to have availed nothing; there were twelve recurrences (35.3 per cent.) in 34 cases.

Excision of the veins of the cord undoubtedly lessens the likelihood of recurrence, but it is followed by hydrocele in almost 20 per cent. of the cases. Splitting of the cord with transplantation of the veins was performed in 47 cases and gave 8 recurrences (17 per cent.); in 6 of the 8 recurrences it was found that the recurrence arose at the site of the transplanted veins.

The percentage of recurrences in the direct hernias is 18.08, and in the indirect, 5.63.

The writer believes it is advantageous to make use of the cremaster muscle, as morphologically it is part of the internal oblique.

Downes (*Archives of Surgery,* 1920, 1, 73) in discussing direct inguinal hernia, believes the patients should be carefully studied be-

fore recommending operation. If the condition of the lower abdominal muscles is such that a fair chance of obtaining a cure cannot be offered, the question of operation should be deferred for the time being and the patient advised to take systematic exercise for a period of from six months to one year.

There is a small but definite group of patients with poorly developed muscles on whom it is not wise to operate for this condition, as recurrence is almost certain to follow.

Complete removal of the sac and the use of the rectus muscle in conjunction with one of the recognized operations for indirect inguinal hernia have reduced the percentage of failure in direct hernia more than half.

CANCER OF THE LIP AND TONGUE

Lain (*J. A. M. A.*, 1920, 75, 1052) has been impressed with the increasing number of cases of epithelioma of the lower lip, and believes that considering the gravity of the condition in adult males, the subject has not been given the study and attention it deserves. The report shows epithelioma of the lower lip to be far more common in outdoor workers, and most frequently seen on the side of the mouth where a cigar or pipe is held. Early diagnosis and proper treatment of the lymph drainage of the lips will materially raise the percentage of cures. Neither surgery, radiotherapy nor any other one method of treatment should be used in all cases alike. Radium and the Röntgen ray, singly or combined, give the most satisfactory results in a selected class of cases.

Some of the important conclusions reached by Broders (*J. A. M. A.*, 1920, 74, 656) in his study of 537 cases of squamous-cell epithelioma of the lip may be quoted. The disease was found most often in farmers, they representing 56.7 per cent. of the cases. The site of the cancer was preceded by a sore or an ulcer in 63.3 per cent. of the cases. About one-fifth of all the patients do not use tobacco, while one-half of the female patients do not use it. Metastasis was demonstrated in 23.38 per cent. of the cases in which the lymph-nodes or salivary glands were removed.

Of the patients operated on and traced, 40.52 per cent. are dead, 59.47 per cent. are alive. Of the living patients 92.85 per cent. report a good result, having been free from the disease on an average

of 7.76 years. The results were not so good in the users of tobacco or in those who had cancer pastes applied before operation. Of the patients with metastasis 17.37 per cent. are living.

The usual treatment of malignant tumors of the antrum has been resection of the upper jaw. The high operative mortality, early recurrence and a small percentage of cures by such measures is greatly improved upon by the use of the cautery and radium as reported by New (*J. A. M. A.*, 1920, 74, 1296), who believes that the operative mortality is thus eliminated and there is a marked decrease in the percentage of recurrences.

Of the eighteen patients with malignant tumors of the antrum three are dead, two have extensive recurrences, and ten are well and have had no recurrence over a period of from eight to twenty-eight months. These patients cannot be considered as cured, but the record indicates that the immediate results have been improved markedly.

While the future of radium therapy is bright, Sonnenschein (*J. A. M. A.*, 1920, 75, 865) urges caution in statements regarding actual cures. It is important to watch for recurrences during a period of from two to five years. In tumors of the nose and throat radium is of great value before and after operations; it relieves pain, hemorrhage, discharge, etc., in many inoperable cases. Sarcoma is especially responsive to radiation; the carcinomas yield much less readily, and the squamous type of epithelioma is scarcely amenable to radium.

Fernet (*Bull. Medical,* 1920, 33, 632) likewise sounds a warning in the case of cancer of the tongue, stating that Röntgen and radium treatment do no good and may actually produce harm. He regards leukoplakia as a potential cancer, for it undergoes malignant transformation in from 15 to 50 per cent. Therefore, all forms of irritating treatment (caustics) should not be employed, and time should not be lost in treating syphilitic lesions of the tongue.

The association of syphilis and carcinoma of the tongue has been investigated by Cary (*J. A. M. A.*, 1920, 75, 858), who found that the specific lesion is approximately three times more common than in association with cancer in other locations about the mouth, 14.5 per cent., or about one in seven cases.

The fact is urgent reason against protracted antisyphilitic treatment in tongue lesions which may be cancer, even in the presence of positive evidence of syphilis. Regardless of the causal relationship

of syphilis to cancer, once a neoplasm has been established the prognosis is that of cancer and not of syphilis, and treating the syphilis will not affect the cancer, but will only delay urgently needed surgery. In cases of this type, before actual neoplasm has developed grossly, Ferrand (*Bull. Medical,* Paris, 1919, 33, 29) states that sections for microscopic examination will reveal the malignant change and be the guide to the necessary surgical measures.

TOXIC GOITRE

In the management of toxic goitre, Frazier (*Annals of Surgery,* 1920, 72, 152) urges that every available agency must be called into play in the nursing of these patients back to health. In the extremely toxic cases X-ray treatments have been employed, but the results have not been altogether satisfactory. It is in those cases in which there is the slightest suspicion of an enlarged thymus that irradiation should be employed, for this condition is responsible for many of the sudden deaths following operation.

In recommending operation shall we discriminate between the mild, moderate and severe cases? In the very mild cases operation is not urgent; by change of occupation and other simple remedies (the care of teeth infection, the removal of infected tonsils and the like) there may be some improvement. But even without improvement if the condition remains stationary and does not handicap the patient, operation remains one of choice rather than of necessity. But in the moderate cases operation has been urged because these are on the threshold of a condition that must always be considered potentially grave. There is no doubt at all that a certain percentage of cases recover spontaneously; nor is there any doubt that a certain percentage are improved or recover by what is called medical treatment, essentially rest; but it is equally true that these are subject to recurrences or relapses, and whether the patient has been under medical treatment or not treated at all, every crisis of hyperthyroidism through which the patient passes leaves that patient a poorer surgical risk. This point must always be borne in mind by those who advise a "course of medical treatment." The degenerative changes which take place in the vital organs during the period of procrastination are permanent and preclude the ultimate and complete recovery of the

patient. For these reasons, therefore, a firm stand is taken as to the propriety of early operation.

The development of toxic symptoms in thyroid adenomata is a generally accepted fact. The removal of the adenoma gives relief also to the patient in exactly the same way and to the same degree as the removal of the hyperplastic gland. Relief also is obtained, according to Crile (*Annals of Surgery,* 1920, 72, 141), by removal of adenomata in those cases in which basal metabolism is not increased, the appetite is not increased and there is no increased sensitization to adrenalin, but in which there is present myocarditis, or a high blood-pressure or neurasthenia. It would seem as if adenoma caused every grade of toxæmia progressively from myocarditis, increased blood-pressure, nervousness and increased metabolism to true exophthalmic goitre. These progressive stages are analogous to the degrees of infection, which vary from mild oral sepsis to empyema of the gall-bladder, acute peritonitis, or acute osteomyelitis. It appears, therefore, that the various types of goitre should logically be regarded as varying degrees of the same or of similar process.

In view of these facts no differentiation should be made between exophthalmic goitre with hyperplasia or thyro-toxicosis from adenoma, as far as treatment is concerned.

Sheehan and Newcomb (*J. A. M. A.,* 1920, 74, 81) have used an injection of equal parts of carbolic acid, tincture of iodine and glycerine, in the treatment of goitre, the object being to produce inflammation, fibrosis and obliteration of the gland tissue.

The action and technic of the method are described, by which means a goodly percentage of parenchymatous goitres are cured. It relieves the thyro-toxicosis in the graver forms, is of no use in the cystic and colloid varieties, and should never be given. It is a safe procedure if the technic is not faulty, is given as a preliminary in all cases going to operation, with the exception of the cystic, colloid and cancerous forms, and is the only hope of relief in the inoperable cases and those in which surgery is refused.

Electric cauterization of the thyroid in severe exophthalmic goitre cases has been used, either as preliminary treatment to ligation or to replace ligation. The method described by Mason (*J. A. M. A.,* 1920, 75, 160) is simple, painless, and has given excellent results.

CANCER OF THE BREAST

Results in the treatment of breast cancer can only be improved by operating upon these lesions in the precancerous stage, according to Rodman (*Southern Medical Journal,* 1920, Vol. 13), who states that there is a time in the life history of every cancer of the breast when it can be removed completely and without even the probability of recurrence or metastasis. In order to bring about this we must not only continue to educate the public to the very earliest symptoms of breast cancer, but even go further than this by preaching that any abnormal condition of the breast has the potential danger of becoming malignant, and, therefore, must be carefully watched by a physician who thoroughly understands it.

In spite of the propaganda carried on by the "Society for the Control of Cancer" and by the medical profession generally, Davis (*Annals of Surgery,* 1920, 71, 270) finds from this standpoint his statistics are disheartening. The average time from which the growth was first noted until operation, before 1910, was one year, three months, eight days, while those operated on during the years 1910 to 1916 were aware of the growth one year, five months, eight days before operation, a difference in favor of the earlier group of exactly two months.

Davis believes it is a mistake to have a set form of incision. The location and extent of the tumor should determine the line of incision and the amount of skin to be removed. If the growth is deeply situated only a comparatively small amount of skin need be sacrificed. If near the surface and especially if the skin is adherent a much larger area should be removed.

Meyer (*Annals of Surgery,* 1920, 72, 177), in reviewing his late results, states that statistics regarding the results of radical operation for cancer of the breast are worthless. They do not prove anything. What does determine the fate of the patients is the so-called virulence of the disease. One and the same surgeon may do an equally radical operation in two seemingly early or apparently equally far-advanced cases, and one may remain well and free from recurrence, while the other may develop a regional recurrence or metastasis within a few months. All we can say is that cancer, being a local disease in the beginning, may be cured by radical operation if done at an early stage.

The results of operation based upon the histologic classification of

the cancer has been reviewed by Iselin (*Schweiz. Med. Woch.*, 1920, 50, 2). In patients given Röntgen-ray treatment after operation, only 4 of 27 with scirrhus survived; of the 56 with simple hard cancer, 33 per cent. were alive after a period of five years, and 10 per cent. from ten to fifteen years. There was 66 per cent. of cures ranging from five to sixteen years in 13 medullary carcinomas. He believes that post-operative irradiation is a contributing factor in preventing local recurrence. On the other hand, Perthes (*Zentralblatt für Chir.*, 1920, 47, 25) found that in his cases there was no improvement in operative results following post-operative raying, and the recurrences within a year were almost twice as numerous as in the unrayed cases, and deaths from metastasis without regional recurrence four times as great.

BONE RESTORATION

Based upon the study of cases of bone graft encountered in both military and civilian practice, Albee and Weigel (*J. A. M. A.*, 1920, 74, 5, 96) believe that a careful observance of the points to be enumerated are essential to success in this class of work.

Early Observation of Wound.—A careful study of the wound should be made before it has healed, if possible. The type of infecting organism (streptococcus hæmolyticus, gas bacillus, etc.), the nature of the clean-up operation and the manner of healing of the wound should be noted.

Time to Operate.—In a few cases it is permissible to operate after the wound has been completely healed for a period of two months, while in others, on account of possible latent infection, it may be advisable to delay the final plastic work for at least six months.

Immediate Preoperative Observations.—For the purpose of determining the existence of latent infections, splints should be removed, and deep massage and rough manipulation should be practiced for a period of from one to two weeks prior to the operation. During this time the temperature should be observed, and the parts should be carefully examined for local tenderness or any evidence of a recrudescence of infection. The field of operation should have a forty-eight-hour preparation, iodin technic being preferred.

Plan of Operation and Choice of Incision.—By means of röntgenographic and physical examinations, the proposed plan of operation, especially in respect to location of graft, should be determined before

incision is made. If possible, the skin incision should not lie directly over the proposed bed of the graft, and the operation should be so planned that the graft may be covered without undue tension of skin and, if possible, so placed that it comes in contact with healthy tissue instead of scar tissue. In several cases in which this has been accomplished, the graft has healed in by primary union, whereas the scar, even at a considerable distance from the graft, has broken down completely. In cases of extensive loss of bone, the scar tissue may be pushed to one side, in order that the graft may lie in healthy tissue. Drainage wicks of any kind should never be inserted at the time of operation.

Duration of Operation.—It is believed that the shortest possible operating time consistent with good work and with a minimum amount of trauma is requisite to successful results in these cases.

Use of Motor-Driven Instruments.—These are essential: (*a*) on account of the necessity for rapid work in order that drying and traumatization of the graft tissues and host tissues may be avoided; (*b*) in order that a cabinet-maker fit may provide for mechanical fixation of parts and for the operation of Roux's law of frictional stimulus to bone growth with a view to an early and adequate establishment of nourishment to the graft; and (*c*) on account of the necessity for the fulfilment of the law of anoci association. The motor outfit with its various tools to produce automatic fits seems indispensable. The motor-saw, when used by the proper technic, does not heat nor glaze the bone.

Adequate Length of Graft.—The graft should always, when possible, be of the inlay type, and sufficiently long to extend into each fragment for a distance of at least 2 inches, and always beyond the sclerosed area.

Type of Graft.—The graft should, if possible, be autogenous, consisting of all the bone layers, namely, periosteum, complete thickness of cortex, endosteum and marrow substance; and it should be so inlaid that the fit is perfect, with exact apposition of corresponding layers of graft tissue to those of the host fragments.

Supplemental Grafts for the Purpose of Osteogenesis.—Small grafts placed alongside the principal fixation graft are most efficacious in supplying additional foci for bone growth.

The Graft as Main Fixative Agent.—Fixation should always be

secured by the graft itself, and not by metal plates or other foreign material, since it is the stimulation from the stress carried by the graft itself that is largely responsible for the healthy metabolism of the graft and for bone growth.

Suture Material.—The graft should be held in place by a minimum amount of absorbable suture, preferably kangaroo tendon, which is the ideal material for this purpose, in that it is tolerated by tissue, readily absorbable, very strong and reliable. Fine absorbable suture material should be used for the skin and underlying soft parts.

Post-Operative Fixation.—The limb should be firmly immobilized by a plaster-of-Paris case for a period of from eight to ten weeks following operation, and as long thereafter as the Röntgen ray shows it to be necessary. Emphasis should again be placed on the importance of using absorbable skin suture material in order that the plaster dressing need not be disturbed until time for the removal of the splint.

OSTEOMYELITIS

An extensive review of their clinical experiences with osteomyelitis has been made by Ochsner and Crile (*Surgery, Gynecology and Obstetrics,* 1920, 81, 263). The important facts obtained from their conclusions are as follows:

An early concise diagnosis and immediate surgical treatment is of the greatest importance.

The operation should invariably consist in splitting the periosteum for a distance of 2 to 5 centimetres beyond the area of pain upon pressure in the bone in each direction.

The periosteum should be loosened from the bone for a distance of 1 to 2 centimetres on each side of the incision.

In extremely severe cases this should be the extent of the primary operation.

In less severe cases ultimate healing can be hastened by carefully opening the medullary canal at the point previously located because of pain upon pressure.

Care should be employed to prevent traumatizing the tissues by rough chiseling.

Moist hot antiseptic dressings with fixation of the extremity and with the use of electric light treatment increases the comfort and facilitates healing.

The shaft of a long bone should never be removed until a good involucrum is formed.

In late cases or in secondary operations upon cases treated as above in the acute stage, every particle of dead tissue must be removed.

At this operation some definite plan must be carried out to facilitate closing the defect.

Skin grafting is of great value in many cases.

Local foci of infection, such as abscesses of tonsils or teeth or sinuses, should invariably be eliminated at once upon undertaking the treatment of patients suffering from osteomyelitis.

Cotton (*Surgery, Gynecology and Obstetrics,* 1920, 81, 254) regards the Carrel-Dakin as "the" method in disinfection of bone wounds. He deplores the wholesale removal of loose bone fragments, as this is often and easily overdone. Generally speaking, remove no bone early when there is infection, but insure wide-open drainage, disinfect and wait for demarcation. Fixation is important in these cases, partly for rest, more to give decent position for repair when repair begins in earnest. Each case must be treated to insure the most accurate adjustment and best contact of fragments, just as soon as our problem ceases to be one of sepsis only, and that should be a matter of days, not weeks.

Persistent bone sinuses following gunshot wounds present a stubborn surgical problem. In spite of prolonged surgical treatment, little progress was being made toward a cure in the many cases treated by Peabody (*Surgery, Gynecology and Obstetrics,* 1920, 31, 512), until a procedure was devised which led to a clinical cure in the majority of cases.

It was found that the presence of an infected bone cavity was the essential cause, that a revision often sufficiently radical entirely to eliminate this faulty configuration was the first step required; the concomitant infection could be effectively controlled and terminated in a comparatively brief time by careful wound treatment based on physiologic and antiseptic grounds. It thereby became possible, as well as desirable, from the functional standpoint, to close these wounds by a bold reconstruction operation.

MULTIPLE HEMORRHAGIC FOCI IN BONE

The therapeutic measure to be adopted in such processes occurring in bone, Barrie (*Annals of Surgery,* May, 1920, 71, 581) believes,

should consist in curetting when the lesions are accessible; where inaccessible for surgical procedure, radium may be tried, or Coley's toxins used. Perhaps more important than anything else in the treatment of bone disturbance of this character will be methods having for their object the restoration of nutritional lime-salt equilibrium. These bone conditions are exceedingly chronic and insidious in their onset; that they, in fact, shorten life does not seem to have been demonstrated.

From Barrie's studies, the following facts may be summarized:

Hemorrhagic foci in bone (hemorrhagic osteomyelitis) should not be considered as neoplasia, producing bone destruction, but rather as regenerative granulation tissue masses whose end effort is restoration of areas already destroyed by some injurious agent.

The etiologic or exciting factors in destruction observed in the multiple processes are not yet fully determined. Endocrinal glandular disturbance, poor lime-salt nutrition, the spirochæte, and other bacterial infections seem to partake in the etiology of such lesions.

The solitary lesions presenting a similar gross and microscopic pathologic picture, in a great majority of instances, give a history of bone trauma.

The affections responsible for the production of processes of the multiple type are low grade chronic systemic diseases that apparently do not definitely shorten the life of the individual to any demonstrable degree. The cases noted in literature have all given histories of many years' duration.

The arrest of repair in which the granulation remains as such without progressive metaplastic change into fibrosis, or the end product bone, is apparently partly due to insufficient formation of fibrogen, thus preventing chemotactic balance.

These lesions, because of their primitive structure, may be regarded as possessing potentialities for neoplastic change, but malignant transformation must be very rare; when such does occur, the scavenger giant-cells apparently take no part and are frequently greatly lessened in number.

Lesions of this character should be regarded as low-grade inflammatory reparative processes and classified accordingly among the regenerative inflammations of bone.

SARCOMA OF THE CLAVICLE

Of the total number of cases collected by Coley (*Annals of Surgery,* August, 1920, 72, 231), 108, the disease was too far advanced for operation at the time of observation in 10 cases, and in 56 cases total excision, or practically total excision, was performed.

It is worthy of note that only 5 patients out of 80 treated by total or partial excision of the clavicle are known to have remained well beyond four years, while 3 out of 4 patients treated by the mixed toxins of erysipelas and B. prodigiosus as a prophylactic after total excision, are alive and well from six to twelve years.

The conclusions drawn by Coley are as follows:

1. Malignant tumors of the clavicle are comparatively rare, only 16 cases having occurred in upwards of 275 cases of sarcoma of the long bones personally observed. The greatest number belong to the sarcoma group, the few cases of carcinoma being metastatic developments from some recognized or unrecognized primary focus.

2. Sarcoma of the clavicle occurs more frequently in men than in women, probably due to the fact of the greater liability of the clavicle to injury in the male than in the female.

3. Sarcoma of the clavicle in the great majority of cases is associated with recent, antecedent, local trauma, either in the form of a direct blow or severe muscular strain.

4. *Diagnosis.*—A clinical history of pain and localized swelling of the clavicle usually following recent injury, with rapid increase in size, supplemented by a fairly characteristic X-ray picture, will usually make an early diagnosis comparatively easy without the necessity of an exploratory operation.

5. *Treatment.*—Local removal of the tumor or even a limited, partial resection should be avoided. The treatment of choice, while the tumor is in an operable stage, should be:

(*a*) Total excision of the clavicle as soon as the diagnosis is made.

(*b*) As soon as possible after operation, a course of systemic treatment with the mixed toxins of erysipelas and bacillus prodigiosus should be begun and continued for a period of at least six months. When possible this should be supplemented with local or regional treatment with radium or X-rays.

6. The mortality of total excision of the clavicle under modern

technic is so small as to be practically disregarded and the functional use of the arm remains unimpared.

ARTHRITIS

The results obtained in the treatment of chronic arthritis by the removal of a distant focus of infection is the subject of a report by Chapman (*Annals of Surgery,* 1920, 71, 648), who found that 50 per cent. of the cases of chronic arthritis treated by the removal of foci of infection, according to clinical observation, showed definite improvement.

From personal observation of 21 cases, the following was noted: (*a*) 76.2 per cent. of the cases showed definite improvement; (*b*) 19.0 per cent. showed no improvement or change; (*c*) 4.8 per cent. were worse after treatment.

Although the percentage of improvement did not vary greatly in the different groups, the most striking results were obtained in those cases in which the focus was situated in the genito-urinary tract. Long-continued faithful treatment is necessary before improvement can be expected in the cases in which the focus is located in the genito-urinary tract.

Very rapid recovery with very few treatments was obtained in those cases in which the teeth were the seat of infection.

Removal of the tonsils in several cases was followed in a few days by loss of pain, and later by return of function to the injured joint.

THE CHLORINE ANTISEPTICS

In discussing the principles underlying the use of the chlorine antiseptics, Lee (*Annals of Surgery,* 1920, 71, 772) states that the practical bearing in the clinical use of the agents, sodium hypochlorite, chloramine-T and di-chloramine-T may be stated as follows:

1. The direct germicidal effect of all the chlorine antiseptics is dependent upon the liberation of their chlorine and the combination of this chlorine with bacterial protein.

2. The rapidity with which the hypochlorite solutions liberate their chlorine necessitates, in order to avoid the destruction of living tissues, the presence of large masses of available protein (devitalized tissues and profuse wound exudate) or the use of such dilute solutions that a safe margin in the relative masses of the active chlorine and available protein is insured. Thus the usable strengths of hypo-

chlorite solutions, which should be less than 0.5 per cent., liberate such a small mass of chlorine that their direct germicidal effect is almost negligible. But, unlike the other chlorine antiseptics, they exert a very definite indirect germicidal effect by the formation of hydroxides, which act as solvents of the culture material provided by devitalized tissues and wound exudate.

3. The synthetic chloramines are more stable compounds of chlorine than the hypochlorites and therefore can be used in greater concentrations or larger germicidal masses. They act practically as reservoirs from which chlorine is slowly and automatically given off as the tissues present the necessary reacting substances (bacterial or tissue protein). (Dunham, *Surgery, Gynecology and Obstetrics,* February, 1918, p. 152.)

4. The hypochlorite solutions are indicated where there are large masses of dead and devitalized tissues or profuse tissue exudate, which cannot be removed by mechanical means. They should not be used where such are not present or applied to tissues poorly supplied with blood or to tendons or cartilage.

5. The chloramines are indicated where there is but little, if any, dead tissue, and where the wound exudate is moderate in amount. Their only value is as a germicide. When in the human tissues, they slowly liberate their chlorine over a period of from three to twenty-four hours and in sufficient quantities to automatically unite with the bacterial and other proteins presented by the wounds.

ENDO-ANEURISMORRHAPHY

Matas (*Surgery, Gynecology and Obstetrics,* May, 1920, 30, 456) has tabulated the results of endo-aneurismorrhaphy as follows:

TABLE I

Total cases up to December 31, 1915						289
Eliminating 6 cases—4 fatal inoperable aortic aneurisms and 2 accidental deaths—leaves a total of						283
Deaths	13, or 4.5 per cent.					
Operative cures and recoveries	270, or 95.4 per cent.					
Cases of gangrene	12, or 4.2 per cent.					
Secondary hemorrhages	6, or 2.1 per cent.					
Of 289 operations there were of the	Cases	Per cent.	Deaths	Per cent.	Gangrene	Per cent.
Obliterative type	193	66.8	10	5.3	9	4.6
Restorative type	65	22.5	2	3.0	1	1.5
Reconstructive type	31	10.7	1	3.2	2	6.4

These operations cover all the large surgical arteries, including the abdominal aorta; 86.1 per cent. involved the arteries of the lower extremity. If the popliteal group is selected as one of the most certain tests for all aneurism operations, we find that it has been performed in all the three types of endo-aneurismorrhaphy, etc., 154 times; of these 103 were obliterative operations, followed by 6 cases of gangrene, 2 secondary hemorrhages, 2 relapses in the reconstructive group, one of which was cured by a secondary obliterative suture. In the 154 popliteal operations there was only one death. The total recoveries as to life were 143, or 99.3 per cent., and the total operative successes as to cure of the aneurism with good function results as to life and limb, 93.6 per cent.

The records of the war showed that injury of the arteries and their veins is one of the most frequent and characteristic injuries of the blood-vessels in modern warfare, and that such injuries exceeded the number in any previous war. At the front 24.7 per cent. of the wounded required special attention for injuries of the blood-vessels, and at the base hospitals 2 per cent. of the wounded were admitted for the treatment of traumatic aneurisms. Of these vascular injuries fully 50 per cent. and more involved both artery and vein.

There is no single method of technic that is applicable to all varieties of arteriovenous aneurisms as these are met in practice. Some few are susceptible of spontaneous cure; some are wonderfully well tolerated and do not call for any surgical treatment whatever, and still a few others, of long standing, are of such a forbidding character that they scarcely justify any surgical intervention. The large majority ultimately come to operation on account of disabling sequelæ and complications. The modern operations should aim at conservation and attempt to save the artery at least. There are cases, however, when suture will have to yield to the radical methods of ligation and extirpation. The experience of Matas has proved that by the adoption of the new technical suggestions, the opportunities for the application of a conservative suture technic can be much enlarged, thereby reducing very considerably the number of radical ligations and extirpations performed with unnecessary frequency and severity in the past, not only in recent military practice, but in the current civilian practice of the day.

BRAIN ABSCESS

The four principal etiologic factors in the formation of abscess of the brain, according to Adson (*J. A. M. A.*, 1920, 75, 532) are otitic infection, frontal sinusitis, injury to the skull and hæmatogenous infection. Brain abscess is usually single, except when it is of hæmatogenous origin associated with a general pyemia, and then frequently it is multiple.

A brain abscess in its course may pass through the initiatory, the quiescent and the terminal phase. The different phases can be determined more definitely from the history and duration of the complaint than from the physical findings.

If the abscess has developed by contiguity, it should be explored through the area of infection; but if the abscess is remote from the source of infection, it should be explored and drained through an osteoplastic flap craniotomy.

Surgical treatment is of little value in the initiatory or terminal stages, or in the presence of meningitis, but it is of great benefit during the quiescent stage. If there is doubt as to the differential diagnosis of brain tumor and brain abscess in the quiescent stage, it is advisable to explore rather than to perform a decompression operation for intracranial pressure or to wait for terminal symptoms.

PERIPHERAL NERVES

Observations in 500 cases of injuries of the peripheral nerves have been made by Frazier and Gilbert (*Surgery, Gynecology and Obstetrics,* 1920, 30, 50), who discuss the principles which have governed them in dealing with the problems applicable to these injuries.

1. Liberation or neurolysis has been given preference in the absence of a complete anatomical division or a neuroma in continuity when, after excising all scar tissue and laying bare the nerve sheath, there is a quick response to faradism.

2. Resection and suture are essential whenever neurolysis is contraindicated. Resection must be carried central and distalward until healthy scar-free fasciculi are exposed.

3. In bridging defects the nerve transplant must not be employed until advantage has been taken of every other reasonable measure: to wit, nerve stretching, immediate or continued (as with sutures

through bulbs); mobilization, transposition, as of ulnar and musculospiral; and in exceptional instances lateral implantation suture, as ulnar or musculospiral into median.

4. When these fail a nerve transplant is justifiable, the autotransplant being the first choice, and homotransplant (preserved in vaseline, liquid petrolatum, or 50 per cent. alcohol), the second choice. For autotransplant the musculocutaneous, the radial or internal cutaneous of the arm, may be selected on the basis of convenience.

5. In nerve suture it is equally important to know what one ought not to do. In this category is included suture á distance, the flap operation, bilateral anastomosis (as recommended by Hofmeister) and tubulization.

6. Sharp clean dissection, careful hæmostasis, the approximation of healthy fasciculi, without undue tension, represent the tripod upon which the success of nerve suture rests.

7. Tendon transplantation should be employed when suture fails and is particularly appropriate in residual palsies of the posterior interosseous, with inability to extend wrist or fingers, and anterior tibial palsies with resulting foot-drop.

8. The after-treatment should include (*a*) enforced fixation for a period of 4 to 6 weeks, (*b*) massage and galvanism until voluntary movement returns, (*c*) exercises varied according to the muscles involved and with a view of sustaining the interest of the patient.

TRIGEMINAL NEURALGIA

The rôle of deep alcohol injections is the treatment for trigeminal neuralgia has been reviewed by Cushing (*J. A. M. A.*, 1920, 75, 441), who states that deep extracranial injections of alcohol into the maxillary and mandibular nerve trunks near their foramina of exit from the skull have completely superseded peripheral neurectomies.

In neuralgias limited to one of the two lower divisions and which may possibly not extend into the other trigeminal areas, alcohol injections represent unquestionably the treatment of choice.

When the neuralgia has spread beyond its original area and come to involve that supplied by the adjacent division, a trigeminal neurectomy must be contemplated; but if no preceding deep injection has been given, it may be useful not only in insuring the type of the

neuralgia but in giving the patient some warning as to what the numbness resulting from the neurectomy may amount to.

They are sometimes useful, furthermore, in determining in doubtful cases whether the syndrome is a true neuralgia of the tic douloureux type or one of the peculiar and rare pseudoneuralgias not amenable to relief either by injections or neurectomies.

Even the extracranial injections are not entirely free from risk, and in no cases should they be purposely pushed to the point of attempting an injection of the gasserian sheath itself.

With such perfect and permanent results as may be secured to-day by a trigeminal sensory root avulsion, the prolonged and repeated use of injections in refractory cases which involve more than one division should be deplored.

POST-OPERATIVE TETANUS

The study of the histories and comments on the various etiological factors, as advanced by those who have written on this subject, have led Huggins (*Surgery, Gynecology and Obstetrics,* 1920, 30, 142) to the conclusion that tetanus is a complication which may follow any operative procedure but is more likely to follow abdominal or rectal operations. More thought should be given to the possibility of its occurrence and, with this in mind, all green vegetables should be withheld for several days before operation. There is danger in all operations around the rectum, genital, and lower rectal regions.

It is significant that the Surgeon General of the U. S. A. ordered a prophylactic dose of tetanic serum given before all rectal operations during the late war. It is probable that this may become routine under certain conditions.

SURGICAL HAZARDS IN DIABETIC PATIENTS

Complications regarded as surgical are the cause of death in a large proportion of cases of diabetes. Fisher's (*Annals of Surgery,* 1920, 71, 382) review of hospital statistics shows that of the fatal cases of diabetes dying beyond the third decade of life about 60 per cent. of the fatalities occur following operations; of the surgical cases with a fatal termination 70 per cent. die in coma, which occurs after operation as often in mild cases of diabetes as in the apparently severe, which means that the estimations were made upon faulty criteria.

Glycosuria is not a reliable guide in the severity of diabetes, and it is generally recognized at present that diagnosis and much more the estimation of the severity of the disease depends upon the degree of hyperglycæmia under varying conditions of diet.

The severity of diabetes in any given case can be estimated only by blood analyses. Infections tend to increase the severity of the disturbance of carbohydrate metabolism and in that way bring about a variable degree of acidosis, the low resistance of the tissues to infection prolongs and intensifies the carbohydrate disturbance and hence of the acidosis, anæsthesia, and especially ether, intensify the disordered processes.

As the chief danger is always acidosis and coma, a determination of this factor becomes the prime requisite. Estimating of the CO_2 combining power of the blood gives a very definite idea of the degree of acidosis. Normal blood shows a combining power for CO_2 above 55 per cent. Severe degrees of acidosis are evidenced by a combining power of 20 per cent. or less. No diabetic patient has successfully withstood operation with a combining power of less than 30 per cent.; 40 per cent. is the lowest figure that permits a reasonable margin of safety.

The injudicious use of sodium bicarbonate is deplored by Kahn (*S. G. O.*, 1920, 71, 363), who gives the following résumé of the rules to be followed in the treatment of diabetic patients.

1. Keep the bowels open, preferably by enemata, in order to avoid diarrhœa and the consequent drainage of alkaline salts from the body.

2. Administer fluids in liberal amounts, a glass of liquid every hour or hour and a half.

3. Increase the tolerance for carbohydrates.

4. Avoid substances that induce the formation of the acids, such as fats and, ofttimes, proteins.

5. Administer substances which favor the combustion of the ketones, as, for example, oatmeal, levulose, alcohol, etc.

6. Do not prescribe alkalies.

Having made certain that the patient is not on the verge of acidosis, or, if this state exists, having, by the measures noted, rid the body of the acid substances, one can, by following either the plan of Allen or by a modified starvation diet, reduce the glycæmia without at the same time decreasing the alkali reserve of the blood. The patient

may now be operated upon, remembering that chloroform or ether should never be used. Nitrous oxide should be used in preference to local anæsthesia, which may induce shock.

RADIUM

The relative values of radium and surgery in the treatment of tumors of the pelvic organs has been considered by Clark (*Annals of Surgery,* 1920, 71, 683), who states that thus far we know that radium greatly supplements surgery, and within the next five years it may possibly supplant the radical operation in even the early cases. The conclusions reached two years ago in a study of one hundred cases of inoperable cancer of the cervix and female genital organs were:

1. As a palliative remedy radium is the treatment par excellence in inoperable cases of cancer of the cervix.

2. In border-line cases in which formerly we accepted the grave risks of an operation in the hope of eradicating the disease, radium is now employed, but in the certainly operable class a radical operation is advocated, this to be followed by post-operative radiation.

3. In cancer of the fundus, even when far advanced, hysterectomy is performed, resorting to radiotherapy only in the face of grave operative contraindications.

In view of further experience, Clark feels that the fourth conclusion, as then set forth, may be modified by a limited claim for actual curability. It was as follows:

"As yet we claim no cures, but, based upon the observation of a considerable number of inoperable cases which have remained locally healed from one to three years, we venture the hope that the quinquennial test will find several survivors."

In the treatment of brain tumors by radium, Frazier (*Surgery, Gynecology and Obstetrics,* 1920, 31, 236) advocates direct implantation in the growth when feasible, rather than more indirect or distant application. In 24 cases of brain tumor, in the treatment of which radium has been employed, no appreciable effect was noted in cases known to be glioma. The endothelioma is unquestionably more susceptible and hence offers the more favorable prognosis. In three cases the growth of the tumor, in the light of the clinical evidence, has been arrested at least, the tumor possibly destroyed, in periods of observation covering a maximum of eight years.

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